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ORGANIZATIONAL DECISION-MAKING

Gregory L. Harm

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

ORGANIZATIONAL DECISION-MAKING

by

Gregory L. Harm

June 1978

Thesis Advisor:

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Given the existing difficulty in evaluating both commercial and public policy formulation and decision outcomes, the conceptual framework developed is intended to be a useful tool descriptively, predictively and prescriptively for analyzing the organizational decision-making process.

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Organizational Decision-Making

by

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Captain, United States Marine Corps
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requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

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ABSTRACT

This thesis develops a heuristic approach to organizational decision-making by synthesizing the classical, neo-classical and contingency approaches to organization theory. The conceptual framework developed also integrates the rational and cybernetic approaches with cognitive processes underlying the decision-making process. The components of the approach address the role of environment in organizational decision-making, develop a typology of decision situations, display the communication of decision dimensions and examine the role of critical variables in the decision-making process. The development of the approach is supported by its application to a short case-study.

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I. INTRODUCTION

A. PURPOSE

In "Foreign Policy in the Making: Bureaucratic Politics,"¹ Caldwell cited ten major approaches to the study of decision-making (see Table I). If one examines these different but interrelated approaches, it becomes clear that any given explanation of the decision-making process is a function of the approach used in analyzing the organizational processes contributing to the decision outcome. Unfortunately, a common frame of reference from which this variety of approaches can be viewed, compared and synthesized to provide a better understanding of organizational decision-making does not yet exist. The purpose of this thesis is to continue the development of a heuristic approach to organizational decision-making by synthesizing the results of earlier writers within a general conceptual framework.

In both commercial and public policy formulation and evaluation, emphasis is on rational techniques for problem solving. However, the application of rational techniques is effective only if it occurs within a realistic set of assumptions, i.e., a conceptual framework appropriate to the situation. Lack of such a framework predictably results in ineffective policy outcomes, as pointed out in the accompanying

¹Caldwell, D., "Foreign Policy in the Making: Bureaucratic Politics," American Behavioral Scientist, May 1977.

Table I: Decision-Making Frameworks²

A. Older Approaches

1. Rational or analytical (Allison, 1971; Steinbruner, 1974)
2. Snyder, Bruck, and Sapin (1954)
3. Political process (Hilsman, 1959; Huntington, 1961; Neustadt, 1960; Schilling, 1961, 1962)

B. Newer Approaches

1. Model II (Allison, 1971) or cybernetic (Steinbruner)
2. Model III (Allison, 1971)
3. "Bureaucratic politics"--a combination of Models II and III (Allison and Halperin, 1972)
4. Cognitive paradigm (Steinbruner, 1974)
5. "Cybernetic perspective"--combination of cybernetic and cognitive (Steinbruner, 1974)
6. "Multiple advocacy" (George, 1972)
7. "Groupthink" (Janis, 1972)

²ibid.

case-study, even though the best rational techniques are used in the process. The value in developing such a framework lies in its capacity to evaluate the organizational decision-making process and its outcomes and to prescribe organizational action appropriate to the decision situation.

B. PROBLEMS ENCOUNTERED IN PREPARING THE THESIS

The problems attendant to accomplishing the objective envisioned for this paper are numerous. To begin with, the literature relevant to the study is vast. In addition to the works of contributors cited in Table I, a wide range of references in organization theory, behavioral and social psychology, cognitive theory, political science and administrative theory is applicable to the pursuit of constructing a useful frame of reference for organizational decision-making; and this list of disciplines is not exhaustive. Due to time constraints, many potentially useful contributions regrettably were not examined prior to developing the position taken in this paper.

In addition to the problem of scope, terminology proved troublesome in this field of study. Among the references that were examined in preparing this thesis, the diversity of academic fields and approaches represented was such that significant conflicts in terminology were commonplace. Because of differing fundamental assumptions and divergence in definitions, confusion about intended meanings of different writers

on the same subject required constant interpretation in order to determine where apparent conflicts in perspectives and conclusions were real or artificial.

In addition to encountering this problem in research literature, it recurs in the effort to explain the perspective taken in this paper. Recognizing this difficulty, consistency in terminology has been attempted and terms subject to multiple interpretations have been considered carefully. Nonetheless, the dilemma remains of choosing between terms, such as environment or uncertainty, which have specific meanings in different disciplines and applying them in a novel manner or coining new expressions with the potential of creating confusion. In dealing with such terms or concepts, an extensive use of quotations has been employed both to clarify the meaning intended and in order to indicate that the concepts in the original quotes are synthesized in the proposed framework.

C. COMPOSITION OF THE THESIS

The paper will begin with a short recapitulation of the classical, neo-classical and contingency perspectives of organization theory. While a review of material which has been summarized by many qualified writers is somewhat tedious, it is nonetheless necessary in an effort having as one objective the synthesis of those approaches. It will then contrast some of the assumptions and implications of the rational and cybernetic approaches as they relate to organization theory. A

consideration of these two approaches is useful in recognizing their applicability to the differing theories reviewed in the previous section. More importantly, both approaches have been used, explicitly or implicitly, by different writers to explain the organizational processes relevant to decision-making. A determination of which of these contrasting cognitive approaches, i.e. rational or cybernetic, is appropriate in explaining the decision-making process is a fundamental step in creating a synthesizing framework. Next is a discussion of the concept of uncertainty reduction and its relationship to the rational and cybernetic approaches and to decision-making. The examination of uncertainty reduction provides two benefits: first, it assists in distinguishing between the relative roles of the rational and cybernetic perspectives in the decision-making process; second, it addresses motivational considerations at both the organization and decision maker levels. Having disposed of the background for and basic assumptions of the approach, the discussion will move to the structure and mechanics of the conceptual framework itself. Examples will be integrated with the development of the approach and an application to a short case-study will be offered.

II. REVIEW OF ORGANIZATION THEORY³

This introductory review of developments in organization theory is not intended to be a comprehensive argument in favor of one particular approach rather than another. Its purpose is to focus attention on some of the critical assumptions, contributions and limitations of the existing, basic schools of thought. Organization theory, in its current state, can reasonably be subdivided into three contrasting approaches: (1) classical theory; (2) neo-classical theory; (3) contingency theory.

A. CLASSICAL THEORY

Classical theory is associated with those approaches (e.g. the rational approach, scientific management, basic micro-economics, administrative theory) which incorporate the image of the organization as a closed system operating under norms of rationality and which are oriented toward predominantly structural dimensions of organizations, i.e., "the anatomy of an organization."

1. Contributions.

The key concepts developed by classical theorists fall into four general areas: (1) division of labor; (2) scalar and functional processes (i.e., vertical and horizontal

³This review draws heavily from W. G. Scott's "Organization Theory: An Overview and an Appraisal;" while the subject is organization theory in general, the relevance to decision-making in organizations is direct.

growth) where scalar processes are exemplified by growth in the chain of command and delegation of authority and responsibility, whereas examples of functional processes are the specialization of sub-units and the evolution of line and staff; (3) structure (defined as the logical relationships of functions in an organization, arranged to accomplish objectives efficiently); and (4) span of control.

2. Assumptions.

Classical theory makes two critical assumptions: (1) the applicability of a closed system perspective of organizations and (2) the imposition of the rationality norm.

3. Limitations.

The major limitations inherent in the classical approach are derivatives of its critical assumptions. Those relating to the closed system viewpoint arise from ignoring the relationship of the organization to its environment. An example is the practice of taking organizational goals as givens, rather than providing a coherent explanation of the mechanisms for goal determination which must take into account environmental constraints and opportunities as well as organizational member's behavior. The emphasis on rational, structural-functionalism fails to account for the behavioral impact of human interactions and the role of concepts such as motivation, expectations, and power relationships. In discussing deficiencies in the basic, or classical, theory

of commercial organizations, Cyert and March indicated these problems:⁴

"First, the motivational and cognitive assumptions of the theory appear unrealistic. Profit maximization, it is commonly alleged, is either only one among many goals of business firms or not a goal at all...On the cognitive side, both the classical assumption of certainty and its modern equivalent--knowledge of the probability distribution of future events--have been challenged.

"Second, the 'firm' of the theory of the firm has few of the characteristics we have come to identify with actual business firms. It has no complex organization, no problems of control, no standard operating procedures, no budget, no controller, no aspiring 'middle management.' To some economists it has seemed implausible that a theory of an organization can ignore the fact that it is one."

Implicit in the classical approach is the perspective that there is a "right way" for organizations to be structured relative to the approach's key concepts identified above. Additional implications of the rational approach will be addressed in a later section.

B. NEO-CLASSICAL THEORY⁵

Neo-classical doctrine is that which is commonly associated with the Hawthorne studies⁶ and the human relations approach.

⁴Cyert, R. M. and March, J. G., A Behavioral Theory of the Firm, p. 8, Prentice-Hall, 1961.

⁵The term "neo-classical" may be taken exception to by some readers. It is used here partly because it is consistent with Scott's terminology. More importantly, it connotes the modification but continued influence of assumptions inherent in classical theory. It is in this latter sense, rather than indicating the literal "resurgence of classical theory," that the term is used.

⁶Rothlisberger, F. J. and Dickson, William J., Management and the Worker, Harvard University Press, Cambridge, Mass., 1943.

It concentrates on behavioral aspects of individuals and groups in the organization and the subsequent need to modify classical assumptions in the light of these factors.

1. Contributions.

The primary contribution of neo-classical theory is the addition of the role of the informal organization. This development recognized the social need of people within the organization to associate with others and the concomitant imposition of social controls such as "the grapevine" and resistance to change.

Additionally, numerous behavioral modifications to the key concepts of classical theory were developed: (1) division of labor--consideration of the effects of fatigue and monotony caused by specialization; the "cog-in-the-machine" feeling of isolation, anonymity and insignificance; the problems of motivation, coordination and leadership in management; (2) scalar and functional processes--the problem of failures in delegation, i.e., too much or too little, and the problems of overlapping spheres of authority or gaps in authority; (3) structure--the perspective that human relationships are inherently disruptive to the established, logical relationships, i.e., friction, and the pursuit of the behavioral implications of line and staff relations; (4) span of control--the determination that the limiting factor is a function of individual ability.

2. Assumptions.

Neo-classical theory essentially accepts the formal postulates of classical theory, but seeks to modify them in light of human behavior. As a consequence, the two critical assumptions of classical theory are similarly modified but are not challenged and supplanted by alternatives. While introducing the micro-perspective of the organization by means of individual behavioral impact, an internal environmental factor, there is a negligible consideration of the impact of the organization's external environment. To this extent, the approach is consistent with classical theory's closed system viewpoint. With respect to the assumption of rationality, neo-classical theory disposes of the classical assumption which perceives organizational man as economic man, however, it implicitly retains norms of rationality for the organization as a whole, i.e., the organization operates rationally even though its members do so only to a limited extent.

3. Limitations.

Those limitations of classical theory related to the closed system and rationality assumptions adhere similarly to the neo-classical approach. In addition, while the existence of the informal organization is demonstrated, its specific relationship to and interactions with the formal organization is not explicated. The approach is further criticized for its tendencies to be non-systematic and to overgeneralize its conclusions. While pointing out significant considerations that

need to be dealt with organizationally, proposed solutions are frequently non-operational in that they are so general or vague as to defy implementation or evaluation.

C. CONTINGENCY THEORY

Contingency theory perceives organizations as open systems in which the appropriateness of specific element relationships is situational. Contingency theory is strongly influenced by the systems analysis perspective that the only meaningful way to study organizations is as systems of mutually dependent variables. As a result, contingency theory shifts the conceptual level of organization study above the previous approaches, i.e., classical and neo-classical theory.

1. Contributions.

The primary contribution of contingency theory is the recognition of the crucial role that environment plays with respect to the organization. The organization is viewed as an open system interacting with the environment; system elements consist of the individual, the formal organization, the informal organization, status and role patterns, and the physical environment of work. The contingency theorist is concerned with discovering the relationships between the parts (elements), the interactions (role theory), the processes (communication, control, decisioning), and the goals of the system (growth, stability, efficient interaction). Additionally, the perspective that the "proper" relationships between the elements of the

organization are contingent upon the situational context has contributed to the negation of the normative impact of the classical/rational approach, i.e., that there is not a "right way" applicable to all organizations.

2. Assumptions.

The basic assumption of contingency theory lies in the holistic approach implicit in the open system perspective. The holistic view of organizations contends that in the classical method of decomposition and independent treatment of the parts, the role of interdependencies is obscured and the synergistic nature of organizations is ignored. The implication is that a knowledge of the parts is not equivalent to a knowledge of the whole.

3. Limitations.

The fundamental limitation to the contingency approach consists of the multitude of varying approaches its practitioners have employed. In conjunction with addressing differing components of the organizational system, various writers have employed alternative cognitive models ranging from rationality, to modified rationality, to cybernetics, to combinations of the above. The consequence of this has been the lack of systematic conclusions and the creation of artificial conflict deriving from opposing initial orientations. H. L. Tosi pointed this out in his description of different approaches and orientations used for organizational analysis:⁷

⁷Tosi, H. L., Theories of Organizations, p. 1, St. Clair Press, 1975.

"Among these are viewing an organization as a cultural product, or as an exchange agent with environment, or as an independent agency, or as a system of structures and functions, or as a structure in action over time, or as a system of dynamic functions, or as a processing system, or as an input-output system, or as a structure of subgroups.

"Additionally, some theories of organized behavior focus on groups. They may emphasize groups as biological social necessities, or as cultural products, or as independent entities, or as an interaction in systems, or as interaction-expectation systems, or as a collection of individual members, or as a summation of member characteristics.

"Finally, subgroups may be the central analytic unit, with the focus on subgroups in interactions with the organizations, or as in interactions with each other."

While Tosi was referring to organizational theory in general, not solely contingency theorists, it is clear that the contingency approach has increased the diversity without contributing to a consensus.

In addition, as in previous models, conclusions arising from contingency writers have been deprecated for their tendency to lack in experimental validation.

D. REQUIREMENTS FOR A GENERAL CONCEPTUAL FRAMEWORK OF DECISION-MAKING

In summation, the difficulty with the existing approaches falls into two general areas: (1) either they take normative positions, as with the classical and neo-classical approaches, even though they are seriously deficient in descriptive validity or (2) there are implicit assumptions employed in the approach which are not made explicit and justified. Specifically,

classical theory fails as a reasonable descriptor, neo-classical theory continues to ignore the impact of the external environment and overgeneralizes on the basis of behavioral assumptions, while contingency theory, with its situational stance, practically refuses to generalize at all. . These are essentially problems of methodology which need to be addressed as a first step in constructing any general framework of organizational decision-making.

A useful frame of reference should be of sufficient detail to provide a means of structuring and analyzing real phenomenon. To do so, the approach must provide a mechanism for identifying the significant elements of the phenomenon and their interrelationships. Accomplishing this provides the descriptive content of the conceptual framework. Manipulation of a valid approach leads to supplementary propositions which add predictive power. Predictive validity is dependent on the assumptions made in developing the framework, on its descriptive accuracy, and on the cogency of derived propositions. A conceptual framework which is sound both as a descriptor and a predictor is a powerful tool for understanding the phenomenon to which it is related. If at the same time the assumptions and dimensions of the framework are such that they simultaneously gain and lend support to existing approaches, both its power and validity are enhanced. Thus, a primary requirement is that a general framework should be a reasonable descriptor

of how things are rather than how they ought to be. Allison⁸ has clearly pointed out that by employing a rational model or a bureaucratic model or a political model, the analyst arrives at differing and sometimes conflicting explanations of the decision process surrounding the Cuban missile crisis. It is interesting that there exists a somewhat weak but defensible parallel between Allison's three models and the three theoretical schools just reviewed: his rational model is in the classical tradition; the bureaucratic model corresponds to contingency theory, i.e., consider Allison's dictum "Where you stand depends on where you sit;" and his political model reflects behavioral interactions, i.e., the neo-classical school. The point here is that each of the models alone addresses significant dimensions of the decision process but is insufficient as a descriptor of the overall process. The perspective taken in this paper is that in the overall process, some combination of these three models is operating and the nature of this interaction should be addressed in a conceptual framework for organizational decision-making. This task entails a reconciliation of the classical, neo-classical, and contingency positions, taking from each the contributions they offer while trying to redress their respective limitations.

⁸Allison, G. T., "Conceptual Models and the Cuban Missile Crisis," The American Political Science Review, v. LXIII, p. 689-718, September 1969.

In a general approach to decision-making, the scope should be broad enough to apply to multiple types of organizations and a wide range of decision situations. While requiring generality, concern must be given to making the framework specific enough to be of analytic usefulness, i.e., clearly applicable for actual case studies of specific decisions in specific organizations.

A third requirement is to delineate the assumptions relative to the appropriateness of differing cognitive alternatives. As previously pointed out, the assumption of rationality is recognized even by its advocates as imperfect. Unfortunately, the only alternative to rationality as a cognitive process seen by some is irrationality, i.e., there is no perceived means of "organizing" other than rationally. Since an alternative cognitive approach does exist, i.e., cybernetics, and has been used in organizational analysis, its usefulness must be considered. In accounting for the processes, interactions and goal formulation in the organizational system, the conceptual framework must determine where, if at all, the rationality norm is applicable and where, alternatively, the cybernetic approach is more useful. It is this particular question with which the next two sections will deal.

III. ASPECTS OF THE RATIONAL APPROACH

This section reviews some of the characteristics, assumptions and limitations of the rational approach. It is not intended to be a thorough delineation of all the implications of that approach, but rather a basis for the following comparison of the cybernetic approach and their respective merits relative to organizational decision-making.

A. CHARACTERISTICS AND ASSUMPTIONS

The rational approach is associated with the four-step problem solving technique of stating a goal or objective, delineating all the alternatives for accomplishing the objective, evaluating the alternatives, and selecting the one which is optimal. Among the assumptions relating to the rational approach is that which characterizes the decision-maker as "economic man" with perfect knowledge of the objectives and of the alternatives. As a problem-solving technique, it assumes ends are givens and that determining the most efficient means is the heart of the analysis.

The use of measures of effectiveness (MOE's), selected in order to quantify alternative outcomes and evaluate them with respect to the objective, is a standard characteristic. The employment of a measure of effectiveness implicitly resolves two problems critical to the analysis. First, the particular measure of effectiveness employed is chosen from among alternative MOE's on the assumption that it best reflects the

critical considerations in goal accomplishment; this is particularly true when the goal itself is not directly measurable or poorly defined, e.g. most public policy goals. The maximization of the MOE is then seen as the means of favorably affecting the accomplishment of the goal. Second, when the MOE is applied to evaluation of alternatives, it implicitly accomplishes value integration, i.e., it supplies a common value by which disparate alternatives can be compared.

A characteristic of the rational approach which has received somewhat less consideration is its normative impact. It is clearly put forth as the appropriate technique for problem-solving, i.e., this is what an individual or organization should do when faced with a decision. The general acceptance of this model, particularly in Western cultures, results in three behavioral implications. First is the tendency of individuals to desire to justify their decisions in rational terms, i.e., to rationalize since, in general, behaving irrationally or illogically is socially perceived as immature, unbalanced or irresponsible. Thus, a person may buy a particular car because they like the color, or style, or because they think it "fits" their self-image or status, not solely or even primarily for rational reasons. However, they will seek to explain their choice to others in rational terms such as "I got an exceptional deal," or "It performs well and really gives you the feel of the road," or "My old car was falling apart." Organizational decision makers are compelled to rationalize in the same way.

While their decision may involve a range of non-rational considerations, they will justify it on its rational merit. The second implication grows from the first. In view of the general social-cultural acceptance of the rational approach, individual expectations for organizations are formulated in that light. Hence, when an individual sees goal conflicts either between organizational goals or between organizational sub-units, he perceives this common phenomenon as an aberration in the system since value integration has not occurred as dictated by the rational approach. Similarly, when decision-makers are faced with difficult policy choices, there is a desire to increase the quantity and quality of information to the point where a clearly superior position will be indicated, since the rational approach dictates that rational-technical information is the critical determinant in choice. This tendency is directly related to the third implication, the expectation of causality. Snyder, Bruck, and Sapin addressed this point:⁹

"The tempting quest for causality--especially of the ultimate or eternal variety--has led in part to a search for logical explanation for events which are essentially the results of chance, that is, the intersection of actions in the political realm which produce new events or conditions unintended by those who took the separate actions in the first place. Chance is therefore that which happens that is not for the sake of some end. Chance is caused by nothing."

⁹ Snyder, R. C., Bruck, H. W., and Sapin, B., Foreign Policy Decision-Making, p. 59, Free Press, 1962.

B. LIMITATIONS

The set of limitations inherent in the rational approach corresponds to the four basic steps of the approach. (1) State the problem/objective--the first critical step is the source of the greatest limitation. As pointed out in the previous section in reference to MOE's, many problems or goals are not of a nature that allows for quantification using an obviously appropriate parameter. In reference to this problem with respect to public policy goals, March and Simon pointed out the following:¹⁰

"The goal of 'promoting the general welfare' is frequently a part of the definition of the situation in governmental policy-making. It is a non-operational goal because it does not provide (either ex ante or ex post) a measuring rod for comparing alternative policies, but can only be related to specific actions through the intervention of sub-goals. These subgoals, whose connection with the broader 'general welfare' goal is postulated but not testable, become the operational goals in the actual choice situation."

This standard technique of factoring the problem or goal into a hierarchy of sub-problems and sub-goals to the point where easily measured criteria exist was described as "local rationality" by Cyert and March:¹¹

"We assume that an organization factors its decision problems into subproblems and assigns the subproblems to sub-units in the organization. From the point of view of organizational conflict, the importance of such local rationality is in the tendency for the individual subunits to deal with a limited set of problems and a limited set of goals. At the limit, this reduces to solving one problem in terms of only one goal."

¹⁰March, J. G., and Simon, H. A., Organizations, p. 156, Wiley, 1958.

¹¹Cyert, R. M. and March, J. G., A Behavioral Theory of the Firm, p. 117, Prentice-Hall, 1961.

The aggregation of solutions, or achievements, relative to the sub-goals is then expected to have an additive, positive effect on the primary goals. This expectation will be realized only if there is no conflict between sub-goals, if there are no losses incurred in aggregating the effects of the sub-goals, if there are no negative synergistic effects and if the operational sub-goals selected are in fact complementary to the non-operational, primary goal. Due to the problems associated with this step, the dominant value in the approach is addressing questions of efficiency rather than those of effectiveness. Unfortunately, as Simon pointed out, operating under the criterion of efficiency leaves significant problems unresolved:¹²

"The criterion of efficiency dictates that choice of alternatives which produces the largest result of the given application of resources.

"It should be noted that this criterion, while it supplies a common denominator for the comparison of administrative alternatives, does not supply a common numerator. Even though all decisions be made in terms of alternative applications of the same resources, the problem still remains of comparing the values which are attained by the different courses of action. The efficiency criterion neither solves nor avoids this problem of comparability."

(2) List the alternatives-- the basic problem here is the prodigious effort required to recognize all possible alternatives available. The standard method of dealing with this limitation is to reduce the consideration of alternatives to

¹²Simon, H. A., Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization, p. 179, Free Press, 1945, 1965.

a relatively small number, eliminating those which are not perceived as economically, politically or socially feasible. The inherent problem in this modification is the frequently arbitrary determination of what is not feasible. Remarking on the "subjective" and "relative" aspects of rationality, March and Simon noted:¹³

"The organizational and social environment in which the decision maker finds himself determines what consequences he will anticipate, what ones he will not; what alternatives he will consider, what ones he will ignore."

Additionally, the rational paradigm promises the desired result if it is followed; however, there is no theoretical reason to expect it to work as it is supposed to once it has been subjected to modification. Thus, even if all other steps were adhered to, once real alternatives have been discarded as unfeasible, there is no assurance that the remaining "feasible" solutions are to be preferred on a rational basis. (3) Evaluate the alternatives--indifference curves represent the rational mechanism offered by utility theory as a basis for determining trade-offs between competing alternatives. Even if the assumptions underlying indifference curves were sound, which is questionable, the problem March and Simon perceived remains:¹⁴

"Without arguing that individuals never assess marginal differences between alternatives, we think that the choice between several satisfactory alternatives depends more on attention cues and the order of presentation than it does on indifference curves."

¹³March and Simon, p. 139.

¹⁴ibid., p. 116

In practice, the use of indifference curves tends to give way to the employment of MOE's so that the assumptions and implicit limitations of using MOE's arise in this step. When the method of factoring the objective into subgoals is used, corresponding sub-MOE's will arise and have the same potential for conflict as the subgoals themselves. This will further reduce the likelihood of value integration and of making an effective linkage between sub-MOE's to subgoals and subsequently to the primary goal. An additional limitation in this step is in the perception of outcomes associated with alternatives. Just as the identification of alternatives themselves represents a significant information burden, so too does that of recognizing outcomes of alternatives. Any given alternative may have a variety of possible outcomes associated with it and this requires a means of determining the expected outcome. While there exist some analytical tools to do so in relatively simple cases of alternative evaluation, they become complex rapidly as the degree of uncertainty increases mildly and become useless beyond that point. March and Simon pointed out the rational approach's dependence on certainty:¹⁵

"1. Only in the case of certainty does it agree well with commonsense notions of rationality. In the case of uncertainty, especially, there is little agreement, even among exponents of statistical decision theory, as to the 'correct' definition or whether, indeed, the term 'correct' has any meaning here.

¹⁵ibid., p. 168.

"2. It assumes: a) that all the alternatives of choice are 'given' b) that all the consequences attached to each alternative are known (in one of the three senses corresponding to certainty, risk, and uncertainty, respectively) c) that the rational man has a complete utility-ordering (or cardinal function) for all possible sets of consequences."

In a similar vein, Steinbruner indicates the impact of uncertainty on game theory, a branch of the rational approach employed for alternative evaluation:¹⁶

"It assumes that the range of possible outcomes is known, and thereby eliminates the possibility that an outcome might occur which was not even visualized in advance. It assumes that the operating characteristics of the game are known--i.e., that its rules are specified and stable. For complex problems neither of these assumptions can be held. Rather, the imposition of enough structure on the situation, so that possible outcomes can be described and their probabilities of occurrence estimated, is itself a matter of uncertainty."

(4) Select the alterantive which maximizes/optimizes the objective--Many theorists have pointed out the tendency to satisifice rather than optimize; again from Simon and March:¹⁷

"Most human decision-making, whether individual or organizational, is concerned with the discovery and selection of satisfactory alternatives; only in exceptional cases is it concerned with the discovery and selection of optimal alternatives."

This means that an anticipated lower level of effectiveness will frequently, intentionally be chosen, particularly if there is a high degree of risk associated with the optimal solution.

¹⁶ Steinbruner, J. D., The Cybernetic Theory of Decision: New Dimensions of Political Analysis, p. 18, Princeton University Press, 1974.

¹⁷ March and Simon, p. 140.

Some noted and valuable efforts have been made to modify the pure rational model, such as Simon's "bounded rationality"¹⁸ and Cyert and March's "adaptive rationality."¹⁹ These efforts recognize the limitations of the "pure" rational approach and try to adopt appropriate adjustments, some of which are indicated in the preceding material. However, the adjustments do not remove the basic inapplicability of the rational approach as an accurate or even reasonable descriptor or predictor of how decision-making in organizations occurs. Moreover, the modifications do not address the normative or expectation-generating aspects of the rational approach. The association of the rational approach with classical organization theory is particularly appropriate in view of their mutual disregard of behavioral implications. Nonetheless, the rational approach does play an important role in organizational decision-making. The subsequent conceptual framework will propose that the rational approach maintains significance for decision-making under certainty and, due to its normative impact, for decision-making relative to organizational design. On the other hand, the rational approach fails to describe with any realism decision-making about complex problems in an atmosphere of uncertainty. The following section will propose an alternative cognitive paradigm designed to deal with this problem, and to act as a better descriptor of the decision-making process under uncertainty.

¹⁸ Simon

¹⁹ Cyert and March

IV. ASPECTS OF THE CYBERNETIC APPROACH²⁰

A relatively short discussion of the characteristics, assumptions, and limitations of the rational approach is facilitated by the fact that the basic approach is one that is familiar to almost all readers. Unfortunately, the same is not true of the cybernetic approach; cybernetics is a term which will be familiar to those who deal in organization theory and the physical sciences and to those who read science fiction, but to few others. Thus, any attempt to briefly discuss characteristics and assumptions of the cybernetic approach in a cohesive fashion would, on the one hand, confuse the unfamiliar reader with excessive terminology and, on the other hand, appear as a gross simplification to the experienced reader. Rather than attempt such a discourse, this section will discuss from a cybernetic perspective those dimensions of the rational approach addressed previously.

A. THE CYBERNETIC APPROACH AS AN ALTERNATIVE

To begin with, the cybernetic approach represents a distinct alternative to the rational approach, not simply an adjustment or modification. The distinction arises as the result of three conceptual contrasts:

²⁰This section draws heavily from Steinbruner's cybernetic theory of decision.

1. Closed system versus Open system --The rational approach, as a component of classical theory, treats the organization as a closed system interacting with the environment to a very limited extent, if at all. Cybernetics takes the open system view found in the contingency approach where the environment continuously and critically impacts on organizational processes.

2. Part versus Whole -- As pointed out before, a fundamental technique of the rational approach is the factoring of the system or problem into its parts, treating them independently and aggregating the outcomes. Cybernetics takes the holistic position that the parts can only be understood as a function of the whole and that the dynamic interactions of the parts precludes the effectiveness of their independent treatment.

3. Causal approach versus Control approach -- The rational approach is one in which causality is a central feature. Cybernetics, sometimes referred to as the science of communication and control, emphasizes control and regulation of system processes. Hage's²¹ example of system reaction to student unrest is an example of this distinction. In the situation where student dissatisfaction generates disruptions to the normal system processes, a control measure, i.e., campus security police, is introduced to eliminate the disturbance

²¹Hage, J., Communication & Organizational Control: Cybernetics in Health and Welfare Settings, Wiley, 1974.

to system norms. When normalcy is restored, the control measure is reduced or removed. It is noteworthy that this process does not address any cause of student dissatisfaction, it simply treats the disruptive symptom.

B. RATIONAL APPROACH CHARACTERISTICS AND LIMITATIONS VIEWED CYBERNETICALLY

Recalling the previous discussion, the usefulness of the rational approach becomes suspect when applied to complex problems and environmental uncertainty. Steinbruner characterizes this situation as follows:²²

- "1. (a) Two or more values are affected by the decision
- (b) There is a trade-off relationship between the values such that a greater return to one can be obtained only at a loss to the other.

"2. There is uncertainty (i.e., imperfect correspondence between information and the environment) of a special character discussed below.

"3. The power to make the decision is dispersed over a number of individual actors and/or organizational units."

In the rational approach (referred to as the "analytic paradigm" by Steinbruner²³), the method of dealing with this type of problem or decision situation has well-defined characteristics with which the earlier discussion has associated conceptual and descriptive limitations. Among these characteristics are the following:

²²Steinbruner, p. 16.

²³ibid.

1. the requirement of value integration
2. the analysis and evaluation of alternatives and their outcomes
3. the expectation that new information regarding central variables of the problem will result in appropriate adjustments
4. the occurrence of causal learning; i.e.:

"In following the process through a sequence of decision points, it can be found analytic if one can observe a causal learning process; that is, an explicit set of calculations which evolve in such a way that higher more general conceptions of decision objectives came to be included (upward expansion), as well as critical environmental interactions which were previously excluded (lateral expansion). The shift from an individual level of analysis (where most of the intellectual development has occurred) to a collective level of analysis is achieved by requiring that the collective process be constrained by an explicit set of calculations, shared by individuals involved, which meet the analytic criteria advanced at the individual level."²⁴

In this last requirement, the conceptual foundation for the use of measures of effectiveness, discussed earlier, is apparent. The combined requirements are such that the rational method of dealing with the complex problem is to increase the complexity of the analysis. This result would seem to be reasonable, i.e., complex problems must have complex techniques for analysis and complex solutions, and it is clearly inevitable in an approach that employs the method of decomposition. However, an alternative to dealing with complexity by increasing

²⁴ibid., p. 44.

complexity is to simplify. With respect to the calculative burden imposed by the rational approach, Steinbruner points out the following:²⁵

"The cybernetic theorist doubts that decision makers engage in sophisticated outcome calculations with any degree of regularity or consistency.

"The result of this argument is a clear rejection of the central analytic assumptions of alternative outcome calculations and sensitivity to pertinent information. The cybernetic paradigm is based on the contradictory assumption of uncertainty control. According to this assumption, the decision maker--primarily and necessarily engaged in buffering himself against the overwhelming variety which inheres in his world--simply avoids direct outcome calculations. Such a decision maker possesses procedures for processing information which in fact generate decisions and outcomes, but psychologically he is not engaged in the pursuit of an explicitly designed result. The psychological effects of uncertainty are therefore held to a minimum..."

Thus, the cybernetic approach simultaneously rejects the complexity and causality required in the rational approach. The fundamental reason for rejection is simply the enormous burden imposed on the decision maker, in the cognitive sense, by those requirements. Steinbruner offers the classic example of a tennis player returning a ball to his opponent to make this point clear. In some manner, the player makes a whole set of decisions with respect to his possible choices: where will he intercept the ball for the return shot; will he return it with a forehand or backhand stroke; in what area of the

²⁵ibid., p. 66.

opponent's court will he return the ball and with what speed and spin? Even by reducing his alternatives by limiting the number of strokes, speed, and spin he can use and dividing the court into a few basic areas, the remaining possible combinations of responses are very high. And yet the player makes his decision in a short period of time, literally seconds. It seems unlikely that any sort of calculations in the explicit sense are the source of the player's decision outcome. Thus, even in a non-complex problem, it is difficult to accept that the rational approach is descriptive of how the decision maker arrives at his conclusion. The cybernetic approach offers an alternative description of the process:²⁶

"Cybernetic mechanisms which achieve uncertainty control do so by focusing the decision process on a few incoming variables while eliminating entirely any serious calculation of probable outcomes. The decision maker is assumed to have a small set of 'responses' and decision rules which determine the course of action to take once he has received information to which he is sensitive. That is: decision rules associate a given action with a given range of 'values' for the critical variables in focus. The 'responses' are action sequences of the character of a recipe, established by prior experience. They are programs which accept and adjust to very specific and very limited kinds of information."

This alternative approach would offer a more plausible description of the tennis player's decision. His "decision" hardly qualifies as such in rational terms; it is more like a reaction, learned in his training and experience, elicited from a set of learned reactions by a few critical variables with respect to the approaching ball.

²⁶ibid., p. 66.

The last portion of the quoted alternative makes reference to the role of information in the process. Where the rational approach assigns a premium to increasing the quantity and quality of information, the cybernetic approach describes an altogether different role:²⁷

"The cybernetic thesis then is that the decision mechanisms screen out information which the established set of responses are not programmed to accept. That is, uncertainty control entails highly focused sensitivity. Since the response sequences adjust to a very narrow range of information, most incoming information will be shunted aside, having no effect...The cybernetic decision maker is sensitive to information only if it enters through an established highly focused feedback channel, and hence many factors which do in fact affect the outcomes have no effect in his decision process."

Thus having disposed of the outcome calculation and causality requirements, the cybernetic approach drastically alters the role of information in the decision process. At this point all four characteristics of the rational approach noted at the beginning of this section have been addressed.

Among the consequences of adopting the cybernetic position is a reorientation of the assumptions relative to fundamental goals of decision makers.

"When forced to characterize the decision maker in purposive terms, the cybernetic theorist would have to assume a fundamentally conservative purpose. The essential problem for the cybernetic decision maker is not to achieve some result in the external world, not even an acceptable as opposed to an optimal result. The cybernetic decision criterion is therefore not that which

²⁷ ibid., p. 67

represents maximum value or a convenient approximation. Rather the essential criterion is simply survival as directly reflected in the internal state of the decision-making mechanism, and whatever actions are performed are motivated by that basic value."²⁸

Here, an additional keystone of the rational approach, the criterion of efficiency, is dealt with. In place of efficiency, the criterion of effectiveness in enhancing survival dominates the decision process.

While not explicitly delineating the cybernetic approach for the reasons given at the beginning of this section, clearly a radically different perspective from that of the rational approach has been developed. A vastly different set of assumptions, processes and variables is used to explain the decision process. The simplified process is as follows:²⁹

"Roughly speaking, the mechanism of decision advanced by the cybernetic paradigm is one which works on the principle of the recipe. The decision maker has a repertory of operations which he performs in sequence while monitoring a few feedback variables. He produces an outcome as a consequence of completing the sequence, but the outcome need not be conceptualized in advance."

In contrast to this "recipe" approach, Steinbruner compared the rational approach to a "blueprint." The rational approach, like a blueprint, has its goal as a given, i.e., what the blueprint is of, and the overriding concern is how to efficiently "construct" what the blueprint dictates. Associated with the blueprint image is its static nature and independence from the environment. Additionally, accomplishment of the

²⁸ibid., p. 64.

²⁹ibid., p. 55.

construction is attained through aggregating the blueprint's component parts.

The problem now is not to choose between these two different approaches, but to determine in what manner they can be used in conjunction to generate a composite framework for describing the organizational decision-making process. Choice between them, in the exclusive sense, is precluded, as Steinbruner pointed out and supported, by research by cognitive theorists which supports the proposition that decision making (or cognitive processes) can occur in accordance with the rational approach. On the other hand,

"The results of cognitive research clearly indicate that value integration is not the only pattern of human inference in trade-off situations and that value integration tends not to occur under conditions of intense uncertainty. Cognitive theory suggests, in other words, that analytic decision processes are highly sensitive to uncertainty and that under high uncertainty a different pattern of mental operations appears. Specifically, it has been discovered that the trade-off relationship violates the principle of consistency and that under complexity, cognitive inference mechanisms tend to eliminate trade-offs from a belief system."³⁰

Once again uncertainty has arisen as a critical factor in determining the appropriateness of cognitive approaches, rational or cybernetic, in describing the decision process. In view of this recurring factor, before moving to a composite descriptive framework for the organizational decision process, the next section will deal with the role of uncertainty in the overall scheme.

³⁰ibid., p. 104.

V. UNCERTAINTY REDUCTION

The following discussion of uncertainty reduction is intended to provide a motivational concept linking the primary elements, i.e., environment, organization structure and the decision maker, of the approach developed in this paper.

A. UNCERTAINTY REDUCTION AS A MOTIVE FOR ORGANIZING

Since man has developed as a social or organizational species it seems quite natural to us to accept that our lives are dominated by organizational activity. In fact, we spend our entire lives as members of organizations with little thought as to why or how, in general terms, this benefits us.

It is the argument of this section that organizations are created and continue to exist in order to reduce uncertainty in the environment. The history of man can readily be viewed as an increasing capability to organize toward this end. Prehistoric man sought survival in an environment which was inherently hostile and uncertain. The advantage gained from pooling resources and providing mutual support was the motive to organize. The evolution of man from hunter, to herdsman, to farmer, to city-dweller, to nation-builder, to space-traveler is reflected in organizational growth, both in size and complexity, and marks an increasing ability of organized man to control his natural environment. Each step in increased size and complexity, while reducing environmental uncertainty,

created or increased organizational or social uncertainty insofar as man's survival became more dependent on the organizational versus the natural environment. Scott indicated the dual role of organizations in dealing with both environmental and organizational uncertainty:³¹

"Traditionally, organization is viewed as a vehicle for accomplishing goals and objectives. While this approach is useful, it tends to obscure the inner workings and internal purposes of organization itself. Another fruitful way of treating organization is as a mechanism having the ultimate purpose of offsetting those forces which undermine human collaboration. In this sense, organization tends to minimize conflict, and to lessen the significance of individual behavior which deviates from values that the organization has established as worthwhile. Further, organization increases stability in human relationships by reducing uncertainty regarding the nature of the system's structure and the human roles that are inherent to it. Corollary to this point, organization enhances the predictability of human action, because it limits the number of behavioral alternatives available to an individual."

In a similar vein, J. D. Thompson pointed out the uncertainty reducing function of culture:³²

"The repertoire of behavior patterns is confined primarily to those having currency in their culture, and one of the significant aspects of culture for any society is that it frees individuals from having to make deliberate choices from among hosts of possibilities."

Thus, there exists a wide range of benefits from large, complex organizations which act to reduce uncertainty in our lives. Many of these factors are so much with us that they

³¹ Scott, W. G., "Organization Theory: An Overview and an Appraisal," Journal of the Academy of Management, v. 4, p. 15, April 1961.

³² Thompson, J. D., Organizations in Action, p. 102, McGraw-Hill, 1967.

are taken for granted; among these are ways of perceiving and categorizing reality; beliefs about cause/effect relationships, definitions of legitimacy, and attitudes toward authority; orientations toward time; and personal aspirations, definitions of the worthwhile life and methods of assessing success.

The individual faces two distinct and opposing strategies with which to pursue the reduction of environmental uncertainty. The first is to seek the extension of his personal power, where power is defined as the ability to cause the environment to conform to some specified, desired state. While this definition of power is non-traditional, it has the virtue of simplicity and reflects the dynamic and equivocal nature of power, i.e., it changes over time and circumstances and may simultaneously be relatively high with respect to one aspect of the environment and low with respect to another. Thus, a person is powerful insofar as he can directly control his environment; correspondingly, he has power over someone else insofar as he controls their environment. Neustadt explained the relationship between power and uncertainty in terms of presidential power:³³

"A contemporary President may have to settle for a reputation short of the ideal. If so, what then should be his object? It should be to induce as much uncertainty as possible about the consequences of ignoring what he wants. If he cannot make men think him bound to win, his need is to keep them from thinking they can cross him

³³ Neustadt, R. E., Presidential Power: The Politics of Leadership, p. 64, Wiley, 1960.

without risk, or that they can be sure what risks they run. At the same time (no mean feat) he needs to keep them from fearing lest he leave them in the lurch if they support him. To maximize uncertainties in future opposition, to minimize the insecurities of possible support, and to avoid the opposite effect in either case--these together form the goal for any mid-century President who seeks a reputation that will serve his personal power."

Authority, on the other hand, is the organizational specification of jurisdiction adhering to positions in the hierarchy of the organization. Thus, power is a personal attribute where authority is an organizational concept, i.e., authority does not reside in the individual, but in the position he fills in an organization and the specific degree to which he exercises that authority is a function of his power dimension. The second strategy is to subjugate oneself to an organization or authority, with the expectation that in exchange for obedience, the organization will provide environmental control. Weber pointed this out with respect to bureaucracies:³⁴

"Entrance into an office, including one in the private economy, is considered an acceptance of a specific obligation of faithful management in return for a secure existence."

In general, each individual establishes a dynamic trade-off between these two strategies. A child, as it grows and matures, indicates a shifting over time from the second strategy to the first. Independent of the particular trade-off for a given

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Weber, Max, The Theory of Social and Economic Organization, A. M. Henderson and Talcott Parsons (trans.), Oxford University Press, 1947.

person, the fundamental goal is the same--reduction of environmental uncertainty.

B. UNCERTAINTY REDUCTION AS A UNIFYING CONCEPT

The role of uncertainty reduction is that of a binding concept between the three principal organizational elements of the succeeding approach: 1)environment; 2) organizational structure; and 3) the individual, or decision maker. The binding effect of uncertainty reduction results from its motivational role at the level of the organization viewed as an entity and at the level of the functional purpose of organization structure and at the level of the individual decision maker in the organization. As a result, the motive to reduce environmental uncertainty provides a fundamental common goal to all three organizational elements.

1. The organization exists to reduce environmental uncertainty, both for the organization as an entity and for its members individually, i.e., to control some aspect of the environment. Control is achieved by the accomplishment of organizational goals. The fundamental goal of the organization is survival in the environment in which the system exists. Survival is enhanced by the conflicting achievements of stability and growth. Where the system exhibits excessive stability, it will tend to reduce its adaptivity to its environment and generate inhibitions to growth; with excessive growth are associated control problems that reduce stability, increase the

dissipation of organizational resources, and expose the system to increased areas of unpredictable environmental interaction. Specific sub-goals are a function of the organizational effort to control or respond to critical variables in the environment. Their accomplishment has the intended effect of maintaining those critical variables within a predetermined, satisfactory range. That is, as a critical variable moves above or below the desired interval, the system adjusts its internal processes by means of feedback to bring the variable back into range. Support for this perspective is offered by Cyert and March:³⁵

"Just as organizations learn what to strive for in their environment, they also learn to attend to some parts of that environment and not to others..."

1) In evaluating performance by explicit measurable criteria, organizations learn to attend to some criteria and ignore others...

2) Organizations learn to pay attention to some parts of their comparative environment and to ignore other parts."

The cybernetic nature, as opposed to the rational, in this perspective is clear.

2. Organizational structure exists in order to coordinate the accomplishment of organizational goals. Efficiency and predictability of effort are dependent on the reduction of uncertainty in the internal functioning of the organization. This general function of structure was pointed out by Snyder, Bruck, and Sapin:³⁶

³⁵Cyert and March, p. 123.

³⁶Snyder, Bruck and Sapin, p. 133.

"Organization, or perhaps more accurately, the rationalization and formalization of behavior through the instrumentality of explicit rules, is itself an effort to reduce uncertainty--uncertainty concerning the internal operation of the system."

3. The individual, or decision maker, seeks the accomplishment of personal goals, both organizational and non-organizational, in order to reduce uncertainty in his environment. Within the organizational context, the mechanisms of uncertainty reduction serve both the organization, by reducing its vulnerability to individual behavior, and the individual, by delineating acceptable behavior patterns. Litterer pointed out this organizational advantage:³⁷

"A formal organization, however, has another advantage, which has not yet been noted. In institutionalizing organizational tasks in positions with specified duties and responsibilities, the organization becomes less dependent on any one individual."

This benefit to the organization is coupled with the ability of the individual being able to avoid the uncertainty inherent in continually reexamining and redefining his own role in the organization. As pointed out by March and Simon:³⁸

"Roles in organizations tend to be elaborate, stable and defined in explicit, even written terms."

The concept of uncertainty reduction not only provides a common fundamental motive for the primary organizational elements, but is also useful in explaining a variety of specific organizational phenomenon. As stated by Cyert and March:³⁹

³⁷ Litterer, J., Organizations, Vol. I&II, Wiley, 1969, p.3.

³⁸ March and Simon, p. 4.

³⁹ Cyert and March, p. 119.

"Organizations avoid uncertainty: (1) They avoid the requirement that they correctly anticipate events in the distant future by using decision rules emphasizing short-run reaction to short-run feedback rather than anticipation of long-run uncertain events. They solve pressing problems rather than develop long-run strategies. (2) They avoid the requirement that they anticipate future reactions of other parts of their environment by arranging a negotiated environment. They impose plans, standard operating procedures, industry tradition and uncertainty-absorbing contracts on that environment. In short, they achieve a reasonably manageable decision situation by avoiding planning where plans depend on predictions of uncertain future events and by emphasizing planning where the plans can be made self-confirming through some control device (e.g. budgets)."

C. SUMMARY OF INTRODUCTORY MATERIAL

Up to this point the reader has been required to examine a relatively large body of introductory material. The purpose in doing so is to develop a general perspective which acts as the foundation for the specific conceptual framework presented in the following sections of the thesis. The key elements in that perspective are:

- 1) Existing approaches to organizational theory in general, (and by implication to the decision-making process in particular), simultaneously provide valuable insights and suffer from critical limitations.
- 2) A general conceptual framework for examining organizational decision-making must synthesize the positive contributions of existing approaches and accommodate their limitations.
- 3) A fundamental point of divergence in existing approaches is the choice of which cognitive process, i.e., rational, cybernetic, or other, underlies the decision process in organizations.

4) As with the approaches themselves, the task is not to choose between cognitive processes but to reconcile their contributions. In preparation for doing so it has been pointed out that the rational approach is significant when the decision situation is simple and well-defined but begins to break down when faced with complexity and uncertainty. Alternatively the cybernetic approach is designed to control uncertainty and simplify complexity by reducing the role of information in the decision process.

5) The concept of uncertainty reduction addresses both environmental and psychological imperatives to organize. It serves as a common motive for the three primary elements in the organizational system, i.e., in the interaction of the organization with its external environment, in the interaction of organization structure in its mediating role between the organization as an entity and the individual member, and in the interaction of the individual decision maker with his environment.

The remaining sections of this paper construct a conceptual framework for examining the organizational decision-making process based on the general perspective developed in the introductory material.

VI. SPLIT-AXIS SYSTEM

The concept of uncertainty reduction as a common motive to the primary elements of the organizational system is reflected in the approach that follows. This conceptual framework, to be referred to as the split-axis system, is intended to describe the interaction between organization structure or design for decision-making and the organizational decision maker. The conceptual framework has four basic parts: 1) the development of the concept of nested environments; 2) a suggested typology for decision situations; 3) a description of the communication of decision dimensions; and 4) an explanation of the concept of linked critical variables.

A. NESTED ENVIRONMENTS⁴⁰

In the effort to understand the organizational decision process, it is necessary to recognize the existence of nested environments. All too often, approaches to organizational decision-making have ignored the impact of the environment, as in classical theory, or concentrated on the environment of one organizational element, as in neo-classical theory, or implied continuity of environments for organizational elements, as in some contingency theory. Thus, even where

⁴⁰ The term "nested" is used in the sense of successive, internal, hierarchical levels; the reader exposed to computer programming may recall the use of "nested" DO loops; a more common example of the "nested" term is the common child's toy which has successively smaller blocks fitting inside each other.

environment is taken into account, the impression is sometimes made that the organization as an entity interacts in some unified manner with the overall environment.⁴¹ This perspective does not account for the fact that there are large numbers of organization members who seldom, if ever, come into contact with what is sometimes seen as the organization's external environment in any organizational capacity, e.g., a production line supervisor, and yet are involved in organizational decisioning. At the other extreme, some organization members may be practically absorbed by the environment due to the nature of their interaction and yet act as decision makers for the parent organization, e.g. a military liaison officer in the Project Representative's Office residing in a defense contractor's plant.

The concept of nested environments attempts to account for the segmented nature of the environment and the organizational interaction with what is actually a variety of environments. Steinbruner and Simon offer the following description:⁴²

"He [Simon] argues that in a number of physical and biological systems, which contain a great deal of variety, there is a hierarchical organization which imposes structure on complexity. A complex environment, which may be conceptualized as a system of elements in a relationship,

⁴¹ A notable exception to this tendency is J. D. Thompson's differentiation of the environment and the role of boundary-spanning subunits of the organization in linking a segmented environment with organizational technology.

⁴² Steinbruner, p. 59.

is everywhere in nature and in human affairs divided into subsystems and so on down through many levels of organization...Within such hierarchically organized systems, the interactions and interrelationships among elements of the same subsystem are generally greater than interaction among elements of separate subsystems--a property which renders complex systems in Simon's terms 'nearly decomposable'..."

"In a decomposable environment there are hierarchically arranged channels of variation that already provide at an abstract level the conditions for successful adaptation by cybernetic mechanisms of decision."

In accordance with this general background, the concept of nested environments places the decision maker in the center of concentric rings, where the adjacent ring represents the mediating factor of organizational structure and the outer ring represents the external environment of the organization (see Fig. 1).

1. Environments (External and Internal) of Organizational Structure.

In this scheme, the external environment of the organizational structure can further be subdivided into two basic components. The first is the task environment of the organization.⁴³ By this, reference is made to those aspects of the environment which have an immediate, ongoing impact on the routine operations of the organization, i.e., its environmental sources of inputs and outputs. For a commercial organization,

⁴³The concept of task environments is well developed; as pointed out by J. D. Thompson (p. 69), "Task environments have been characterized by March and Simon (1958) as hostile or benign. Dill (1958) distinguished task environments as homogeneous or heterogeneous, stable or rapidly shifting, and unified or (by implication) segmented..."

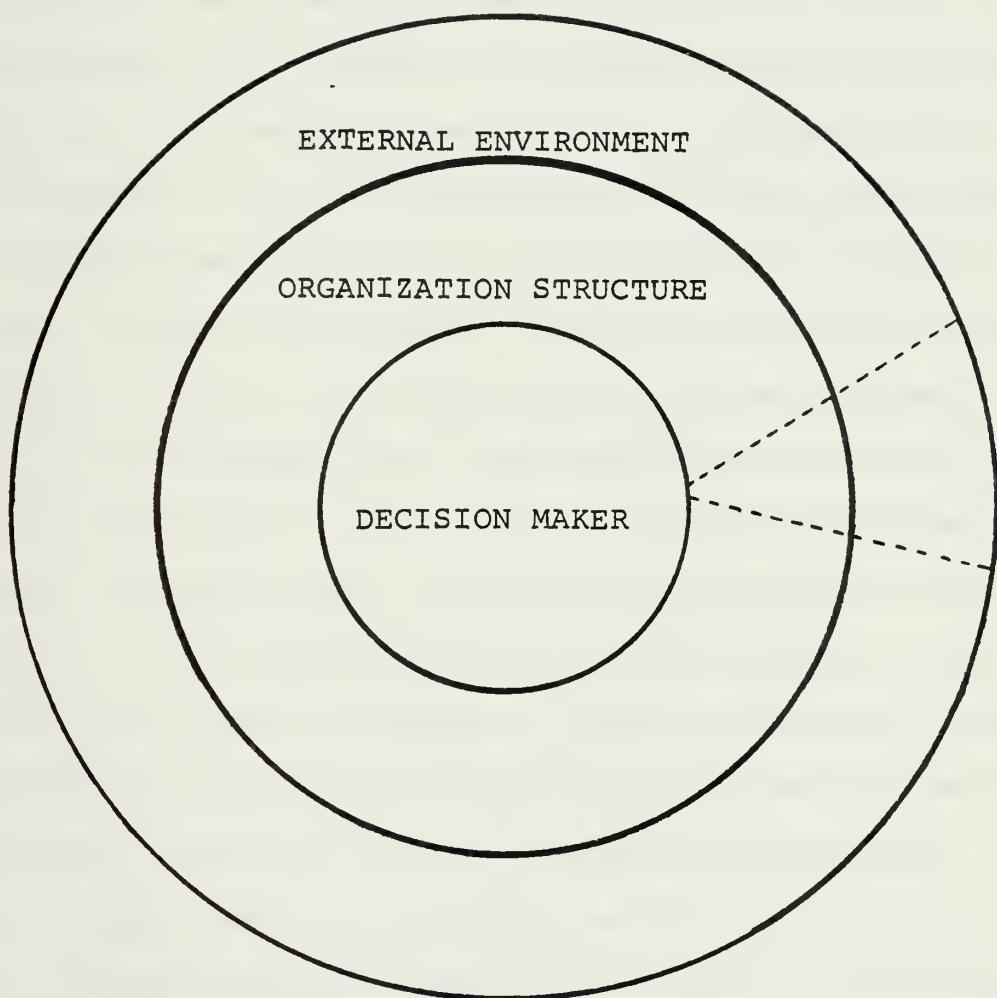


FIG. 1 Concentric Rings of Nested Environment

its suppliers and markets are elements in its task environment. The second component is the extended environment which consists of diverse elements such as social attitudes and demographic considerations. An environmental element may move between these two components with changes in time and circumstances. For example, ecological considerations once relegated to the extended environment have become significant elements in the task environment of many organizations.

Organizational structure is functionally differentiated in order to deal with specific aspects of the task environment. (Indicated in Fig. 1 by wedge-shaped section encompassing one segment of environment and a corresponding segment of organizational structure.) With respect to the decision-making process, this generates a situation significantly different from that of the organization as a whole interacting unilaterally with the environment. The organizational decision maker charged with direct interaction with the task environment represents a minority in large, complex organizations. Even these decision makers will relate to the environment in terms of those specific aspects encompassed by the functional responsibilities of the structural subunit of which they are a member. Very few organizational decision makers, if any, are tasked with dealing with environmental-organizational interaction as a whole. The internal environment of the organizational structure, for decision purposes, consists of

its formal sub-structure and corresponding decision makers. For simplicity, Fig. 1 indicates only one ring of structure and decision maker; however, each hierarchical level in the decision process generates a corresponding set of structural-decision maker rings. Thus, organizational structure interacts with two distinct environments, one outward and one inward, seeking uncertainty reduction in both environments.

2. Environment (External and Internal) of the Decision Maker

Similarly, the organizational decision maker interacts with both an external and internal environment; however, it must be stressed that his environments are different from the corresponding organization structure environments. The external environment for the decision maker, as pictured in Fig. 1, is the formal organizational structure, whereas his internal environment consists of the decision maker's personal values and attitudes. The decision maker, like the organization itself, seeks uncertainty reduction with respect to these environments. Thus, while actually participating in a complex system his position is simplified by cybernetic mechanisms.

"The adaptive capacity of cybernetic mechanisms occurs when the decision maker is operating within a stable environmental subsystem. There may be great complexity in hierarchical levels above and/or below this subsystem, and the consequences of actions taken in these other areas of the environmental hierarchy may be considerable. However, whatever the consequences in the larger environment, decisions according to the paradigm are controlled by events within the subsystems."⁴⁴

⁴⁴ Steinbruner, p. 61.

3. Summary

In this arrangement of nested environments, the internal environment of organizational structure is simultaneously the external environment of the decision maker. The perspective taken here is that the environment relative to organizational decision-making is highly segmented and problem-specific. This means that the environmental considerations for a specific decision situation are a function of the problem which generates the decision situation and of the hierarchical level the decision maker occupies in the organization. Thus, for one decision situation, a decision maker will be responsive to one set of environmental elements while for another decision situation the same decision maker will consider a different set of elements. Similarly, for the same given decision situation a decision maker at one level in the structural hierarchy will respond to a different set of environmental considerations than a decision maker at a higher or lower point in the hierarchy dealing with the same decision situation. The organizational method of linking nested environments for decision-making purposes is the subject of the next two components of the split-axis approach.

B. TYPOLOGY OF DECISION SITUATIONS

The purpose of this section is to propose a technique for categorizing decision situations in terms of three basic variables: 1) significance; 2) time; and 3) precedence. There are two reasons such a typology is useful:

1) One of the problems inherent in the discussion of decision-making is the wide range of variables that comes to bear in the decision-making process. Snyder, Bruck and Sapin provide a listing of just some of the relevant considerations:⁴⁵

"We have said that the key to the explanation of why the state [organization] behaves the way it does lies in the way its decision-makers as actors define their situation. The definition of the situation is built around the projected action as well as the reasons for the action. Therefore, it is necessary to analyze the actors (the official decision-makers) in the following terms: (a) their discrimination and relating of objects, conditions and other actors--various things are perceived or expected in a relational context; (b) the existence, establishment, or definition of goals--various things are wanted from the situation; (c) attachment of significance to various courses of action suggested by the situation according to some criteria of estimation, and (d) application of 'standards of acceptability' which (1) narrow the range of perceptions, (2) narrow the range of objects wanted, and (3) narrow the number of alternatives."

Given this range of considerations and the differences inherent in the problems toward which decision-making is addressed and in the circumstances in which the decision process occurs, it is clear that no two decision situations are ever precisely the same. As a result of this, when general statements about or comparisons of decision situations are made, they are frequently challenged by the argument that dissimilarities in the decision situation are too significant to allow for valid generalizations or comparisons. While recognizing that differences are significant, the typology developed here suggests

⁴⁵Snyder, Bruck and Sapin, p. 65

there exist sufficient similarities occupying a dominant role in decision situations to support useful and reasonable generalizations. Thus, in spite of obvious differences in particular decision situations, the organizational system is viewed as "a set of relatively fixed roles and relationships--and the activities flowing from them--characterized by repetitive, predictable behaviors, the roles and activities being bounded by a particular decision-making event."⁴⁶ This position is not unlike that taken by psychologists in their field. Although they recognize that no two individuals are the same, they can nonetheless make valid statements about behavior in general. Thus, the fundamental proposition of this section is that any decision situation can be described in terms of general decision dimensions. The value in doing so is pointed out by Snyder, Bruck and Sapin:⁴⁷

"It is difficult to see how we can account for specific actions and for continuities of policies without trying to discover how their operating environment is perceived by those responsible for choices, how particular situations are structured, what values and norms are applied to certain kinds of problems, what matters are selected for attention, and how their past experience conditions present responses."

In addition, "the capacity to predict the consequences of patterns of action involved in decision-making might help the

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Steinbruner, p. 213.

⁴⁷

Snyder, Bruck and Sapin, p. 5.

policy-makers to solve some of their organizational problems."⁴⁸

2) The second reason for generating such a typology is that it results not only in the ability to categorize decision situations themselves, but to correspondingly categorize organizational techniques for dealing with different types of decision situations. Once a typology has been established, characteristics of organizational reaction to decision situations become more predictable. As stated by Snyder, Bruck and Sapin:⁴⁹

"Since we are dealing with planful actions (rather than random behavior), interaction is characterized by patterns, that is, recognizable repetitions of action and reaction. Aims persist. Kinds of action become typical. Reactions become uniform. Relationships become regularized."

A fundamental proposition of the split-axis approach, to be supported in the next section, is that a primary function of organizational structure with respect to decision-making is to identify the dimensions of decision situations in organizational terms, to determine methods of dealing with different decision situations, and to provide a means of communicating the dimensions of the problem or decision situation to the decision maker. By implication, this simultaneously indicates the appropriate general procedural techniques with which the decision maker should respond. Therefore, for purposes of developing a

⁴⁸ ibid., p. 37.

⁴⁹ ibid., p. 62.

typology of organizational decision situations, the three dimensions of significance, time and precedence will be considered only in organizational terms.⁵⁰ These variables can be pictured (Fig. 2) in a three dimensional axis system, labelled organization structure in order to emphasize that the values of the variables are arrived at from the organization's perspective.⁵¹

The consideration of correspondingly high and low positions of dimensions on this set of axis generates a typology of general decision situations. Relative positioning on the dimension axis is a function of the following considerations:

- 1) Significance dimension--the significance of a particular decision situation for the organization is evaluated in terms of two factors. The first is the level of threat to the actual survival of the organization; the second is the amount of organizational resource commitment involved. Decision situations involving high threat and/or large resource commitment are of high significance, whereas those of low threat and little resource commitment are of low significance.

⁵⁰"Organizational terms" refers to the evaluation of decision dimensions in the light of organizational values. Consideration of the fact that the actual decision maker evaluates decision dimensions both in organizational and non-organizational terms will be addressed in a later section.

⁵¹Readers familiar with Charles Herman's "International Crisis as a Situational Variable" will recognize this axis system of representing typological variables. Whereas Herman addressed the variables relating to international crisis situations, this paper attempts to extend that conceptual framework to decision situations in general.

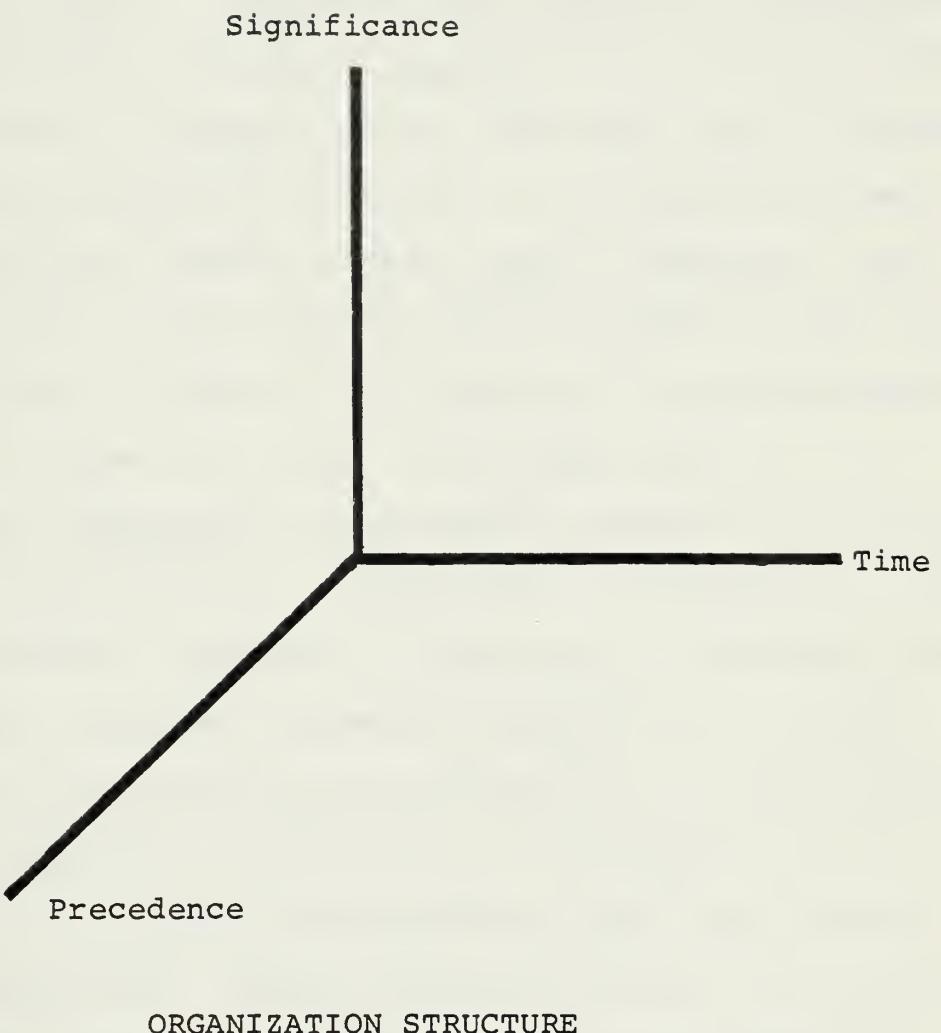


FIG. 2 Dimensions of the decision situation

2) Time dimension--the dominant consideration in the positioning of the time dimension is the amount of time available in the decision situation before a decision must be made, i.e., the level of urgency. Subsidiary time aspects in distinguishing decision situations are time to implementation of the decision and the duration of decision effect. When the level of urgency in two decision situations is similar, the subsidiary aspects become significant; however urgency tends to dominate. Thus, for the time axis, if the time in which to decide is long, the location is high; if short, the location of the time dimension is low, i.e., nearer the origin in the axis system.

3) Precedence dimension--by precedence, reference is made to the relative uniqueness or, alternatively, routineness of the decision situation. Care must be taken not to associate with the precedence dimension any sense of prioritization, since this aspect of the situation is accounted for in the significance dimension. Precedence reflects that the organization is endowed with "...a learned set of behavior rules--the standard operating procedures. These rules are the focus for control within the firm. They are the result of a long-run adaptive process by which the firm learns; they are the short-run focus for decision-making within the organization."⁵² Thus, a decision situation which has a predetermined standard operating procedure associated with it is high in precedence; one which

⁵²Cyert and March, p. 113.

has aspects which preclude its association with past decision situations and procedures is low in precedence.

Employing a typological mechanism of this nature, it is possible to describe distinct decision situations and some general characteristics of how organizations tend to deal with them. The combinations generated for the high significance situations are offered as examples:

1) Case of high significance, long time and many precedents.

Decision situations described by this pattern are dealt with by long-range planning, such as budgeting. The procedures used in the planning process tend to be detailed and standardized. While standardized planning procedures are intended to increase the effectiveness of plans, in practice, form tends to displace substance, i.e., the result is a preoccupation with the standard procedures instead of the effectiveness of the plan. In part this is due to the rational expectation that to plan in great detail by approved methods is to plan well. The general effort entails the attempt to impose certainty through organizational plans on an inherently uncertain future. One effect of such planning is to create artificial precedence for subsequent decisions made in the area to which the plan relates, i.e., future decision situations are not evaluated solely on their objective dimensions but in the light of the expectations created by planned dimensions conceived in past periods. Thus, the evaluation of the situation may be dominated by the predicted dimensions of the plan rather than the objective

dimensions of the real situation. The Five Year Defense Plan (FYDP) prepared within the Department of Defense provides an example of the application of these organizational techniques associated with the long-range planning decision situation.

2) Case of high significance, long time, few precedents. By altering one decision dimension, precedence, a new decision situation in the typology is generated. The high-long-few pattern of decision situation calls for innovative planning. This is the case where some new element in the environment, or problem, presents itself and does not accurately fit the existing planning dimensions or procedures. A rationally desirable response to this situation would be to identify the unique characteristics of the new element and adopt new or adjusted procedures for dealing with it accordingly. The most likely reaction to this situation, however, is to fail to segregate it as unique and to force-fit it into the existing procedural scheme, i.e., to impose precedence where none exists. The military response to national insurrections involving guerilla warfare is an example of this tendency. Not surprisingly, in the development of strategic plans, the military approaches the definition of the situation and its solution in military terms. The overriding characteristic, i.e., the political nature of the conflict, is given a secondary role at best. As a consequence, the methods of evaluating the implementation of the strategic plan reflect traditional military concerns, i.e., the destruction of the enemy's military force

(body count) or the occupation of geographic and economic strongpoints (control of the cities). However, success in improving the evaluative indices does not necessarily result in the successful elimination of the causes or symptoms of guerilla insurrection. This is simply due to the fact that both strategic planning and implementation do not reflect the proper dimensions of the decision situation.

3) Case of high significance, short time, many precedents.

The high-short-many decision situation for organizations can be described as the emergency case. As in case 1) where precedence is high, standard operating procedures dominate the predictable organizational response. Particularly in view of the time constraint, SOP's increase the probability of an acceptable response by the decision maker. As pointed out by Simon,⁵³ "An increase in the use of categorization for decision-making decreases the amount of search for alternatives." Most organizations are relatively successful in predicting and providing for the emergency case. This success is a consequence of the high precedence dimension enabling the organization to foresee relevant natural and man-made emergencies, e.g. fire, flood and accidents. The duty officer in a military organization, provided with a detailed set of orders and procedures, represents an organizational response to this decision situation. For any predicted emergency situation, the acceptable organization response is provided, e.g. call the fire department, call the MP's, call the hospital, etc. What is required of

⁵³ Simon, p. 39.

the duty officer is not so much a decision as a thorough knowledge of the SOP's and a cool head in executing them. Problems with this response technique occur when the decision maker, as in case 1), gives his full concern to the proper execution of the SOP's rather than attending to their effectiveness. This tendency results in the underdevelopment of initiative and flexibility, which may become critical if special circumstances not provided for in the procedures alter the nature of the emergency.

4) Case of high significance, short time, few precedents.

The high-short-few case represents the unpredicted emergency, or crisis situation. It may result from a predicted emergency in combination with special circumstances causing the procedures associated with the emergency to be ineffective or it may be a completely unforeseen event. As in case 2) where precedence is low, an innovative response is called for. A typical organizational response for this decision situation is to designate a group of decision makers composed of high-level and/or specialized personnel to develop alternatives and select a solution. Insofar as this occurs, this response is particularly susceptible to the problems associated with "groupthink."⁵⁴ While this benefits a decision process under a time constraint by

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Janis, I. L., Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes, Houghton Mifflin Co., 1972.

artificially limiting search for alternatives and solutions, it concomittantly reduces the probability of arriving at an innovative response. Thus, again as in case 2), the effectiveness of the decision outcome tends to be sacrificed in order to increase the efficiency, i.e. certainty, in the decision process or procedure.

It must be noted that up to this point the relative positions of decision dimensions have been viewed only from the perspective of organization structure, i.e., for the value in formal organization terms, not that of the decision-maker. This perspective, while useful in developing a typology, obscures the impact of the decision-maker's perception. For example, clearly a decision situation having high significance for the organization need not be perceived by the actual decision maker as having high significance to himself. Conversely, a decision situation of relatively low significance to the organization may be seen as crucial by the decision maker. It is precisely this dichotomy that the split-axis system for communication and interpretation of decision dimensions attempts to display.

C. COMMUNICATION OF DECISION DIMENSIONS IN THE SPLIT-AXIS SYSTEM

By way of introduction to this section, a simple analogy is useful in developing the perspective the split-axis system uses in explaining the relationship between organization

structure and the decision maker. The setting for the analogy is that of a company office where the commanding officer is returning from a meeting which has occupied him for the last two or three hours. Going to his desk, he sees his in-basket, which was empty when he left, has 20-30 new items in it. Rather than simply taking the item on top and dealing with it, he takes the entire stack and begins sorting. His sorting, guided by experience, is originally based on the subject matter of the material; he may have one pile for personnel matters, one for logistics, one for training, one miscellaneous, etc. Having sorted his original stack of 20-30 items by subject matter, or functional category, into several piles of 5-6 items, he turns to dealing with the piles. He deals first with the pile that seems most important; his perception of importance is guided by his past organizational experience, his personal interest, his knowledge of his commanding officer's priorities and preferences and other such factors. Within each pile, he similarly ranks the priority of the individual items; some may reflect the continuation of actions or policies of a previous period, some may be requirements for routine reports; some may carry specified deadlines for action; some may be of general information value requiring no direct action. In any case, in the process of sorting he makes a determination of how important the items are, how soon they must be dealt with, and what the appropriate response is. Having done so, he disposes of the piles by preparing them for further action by his company first

sergeant. The bulk of the items require no special input on his part since they fall within routine procedures of which he is confident the first sergeant has knowledge; he may annotate some items with specific instructions with respect to content or priority of response. Having completed this task, the commanding officer reaggregates his piles into a stack and puts it in his out-basket. After a time, the first sergeant enters his office to pick up any outgoing items; the commanding officer mentions that it's mostly routine but emphasizes a couple of special items. In taking the stack to his desk, the first sergeant unfortunately drops it. In resorting the stack at his desk, the first sergeant categorizes the items in the same manner as the commanding officer. In dealing with routine matters he, like the C.O., is guided by his experience, his interests and his knowledge of his C.O.'s priorities; in the cases of the special items he has the additional guidance of the commanding officer's annotations. His success in recategorizing the stack in the same way the C.O. did, and consequently implementing action in accordance with the commanding officer's expectations, is a function of his commonality of organizational experience with the C.O., his knowledge of standard procedures, an understanding of their relative interests and a correct interpretation of the annotations accompanying special items.

In the split-axis system, the role of organization structure corresponds to that of the commanding officer in the

analogy; it is the function of first categorizing organizational decisioning into functional categories (e.g. for a commercial organization, sales, production, distribution, personnel, etc.; for a governmental body, defense, agriculture, commerce, etc.) and then within functional categories prioritizing decision categories, or situations, in terms of their dimensions, i.e., significance, time and precedence. The first sergeant in the analogy corresponds to the actual decision maker in a specific decision situation, who must identify the dimensions of the situation in the same manner as the formal organization has provided for in order to arrive at a predictable and appropriate decision outcome. These roles will be developed in greater detail in the following material.

The organizational decision-making process involves the perception of decision situations in the light of organizational goals which in turn are generated by problem areas in the environment. The organizational technique of associating decision areas with functional categories, or sub-units, has both cybernetic and rational aspects. "The cybernetic paradigm suggests rather that the central focus of the decision process is the business of eliminating the variety inherent in any significant decision problem."⁵⁵ Clearly, one method of reducing variety in the decision problem is to reduce its scope by decomposition and to specialize decisioning by functional areas. At the same time, the technique of decomposition is

⁵⁵ Steinbruner, p. 56.

one associated with the rational approach, or analytic paradigm. The resolution of this paradox is dependent on a proposition derived from the concept of nested environments. In a hierarchy of nested environments, any given level in the organizational structure simultaneously acts as the external environment for its subordinate level in the hierarchy and as the internal environment for the level superior to it. This simply reflects that hierarchical positions involve both superior and subordinate roles. The proposition resolving the paradox of cognitive approaches, i.e., cybernetic or rational, is that in relation to the external environment, elements of organization structure behave cybernetically while the relationship of the same element to its internal environment, i.e., the subordinate level in the hierarchy, is governed by the rational approach. Thus, perception from the "bottom-up" is cybernetic, while expectation from the "top-down" is rational. This "bottom-up," or outward-looking cybernetic role is supported by Cyert and March's characterization of the decision-making process:⁵⁶

"First, organizational decisions depend on information, estimates and expectations that ordinarily differ appreciably from reality. These organizational perceptions are influenced by some characteristics of the organization and its procedures. The procedures provide concrete estimates--if not necessarily accurate ones. Second, organizations consider only a limited number of decision alternatives. The set of alternatives considered depends on some features of organizational structure and on the locus of search responsibility in the organization."

⁵⁶Cyert and March, p. 83.

On the other hand, the "top-down," or inward-looking role is dominated by the normative impact of the rational approach. Simon and March's expectation of rationality in organizational design provides an example:⁵⁷

"The need for an administrative theory resides in the fact that there are practical limits to human rationality, and that these limits are not static, but depend upon the organizational environment in which the individual's decision takes place. The task of administration is so to design this environment that the individual will approach as close as practicable to rationality (judged in terms of the organization's goals) in his decisions."

Thus, the perspective taken in the split-axis system is that organizational design for decision-making is characterized by the rational approach, whereas the actual process of decisioning by the subordinate decision maker is cybernetic in nature. This characterization extends the perspective developed in the section on nested environments. At the end of that section, it was pointed out that the perception of the decision situation by the decision maker is a function both of the problem generating the decision situation and of the hierarchical level at which he is located. The position taken here is that the perception of the decision situation is also dependent on whether the decision maker's role in the decision process is in the "top-down" mode, i.e., rational, or in the "bottom-up" mode, i.e., cybernetic.

Recognizing this dichotomy in cognitive approaches, the split-axis system attempts to depict the interaction. "We

⁵⁷ Simon and March, p. 240.

begin by talking about two kinds of decision-making process analysis: organizational and intellectual. These two are related because the former (1) determines whose calculations and discussions will be authoritative and (2) provides ingredients for the intellectual process through intelligence and other functions. Intellectual process results in the definition of the situation.⁵⁸

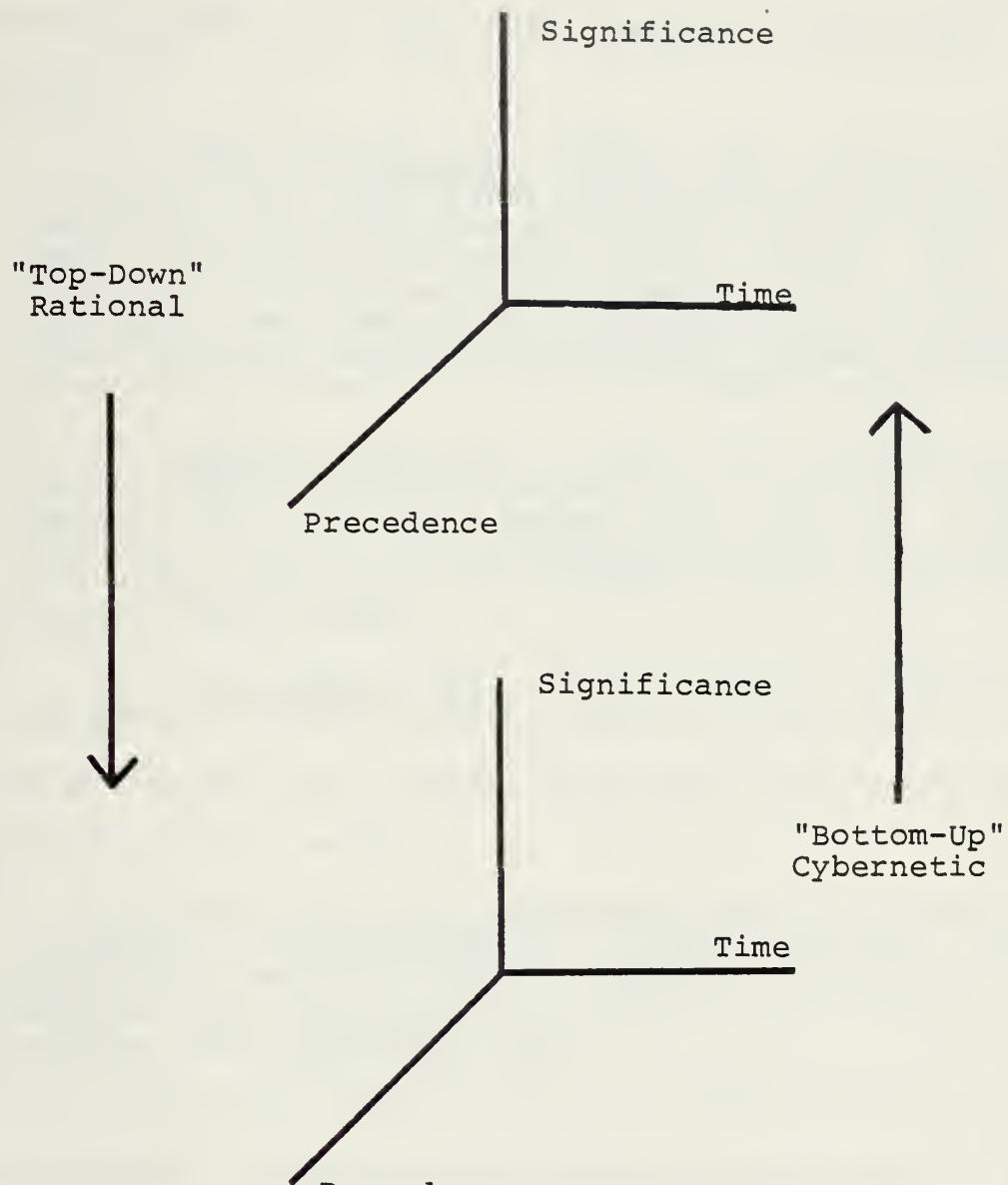
The elements of the split-axis system are displayed for reference in Fig. 3. In picturing the nature of the relationship, it may be helpful to consider Fig. 3 as representing one superior level in the hierarchy of nested environments, the organization structure set of axis, interacting with its subordinate level, the decision maker set of axis in defining the decision situation and arriving at a decision outcome.

1. The Role of Organization Structure

As pointed out in the preceding section in developing a typology for decision situations, the primary function of organization structure with respect to decision-making is to identify the dimensions of decision situations in organizational terms, to determine standard procedures for dealing with different decision situations, and to provide a means of communicating the dimensions of the decision situation to the decision maker. Cyert and March's discussion of general choice

⁵⁸Snyder, Bruck and Sapin, p. 242.

ORGANIZATION STRUCTURE



DECISION MAKER

FIG. 3 Interaction of Organization Structure and the Decision-maker in Communicating Decision Dimensions

procedures in organizations offers a perspective of how structure accomplishes these tasks based on three basic principles:⁵⁹

"1. Avoid uncertainty. Rather than looking for ways of dealing with uncertainty through certainty equivalents, the firm looks for procedures that minimize the need for predicting uncertain future events. One method uses short-run feedback as a trigger to action [the emergency case in the previous typology is an example of this], another accepts (and enforces) standard decision rules [e.g. budgeting in the long-range planning case].

"2. Maintain the rules. Once it has determined a feasible set of decision procedures, the organization abandons them only under duress. The problems associated with continuously redesigning a system so complex as a modern firm are large enough to make organizations cautious about change.

"3. Use simple rules. The firm relies on individual 'judgement' to provide flexibility around simple rules."

In a similar vein, Snyder, Bruck and Sapin characterize the process as follows:⁶⁰

"Organizational decision-making emerges, then, as a function of organizational structure and goal, subjectively viewed as a set of rules for the actor, information, about which more will be said in the next section, and personality type..."

Thus, the first purpose served by organization structure is to provide a response to the external environment of the organization by means of functional specialization. As stated by Cyert and March:⁶¹

"Through delegation and specialization in decisions and goals, the organization reduces a situation involving a complex set of interrelated problems and

⁵⁹ Cyert and March, p. 102.

⁶⁰ Snyder, Bruck and Sapin, p. 128.

⁶¹ Cyert and March, p. 118.

conflicting goals to a number of simple problems. Whether such a system will in fact 'resolve' the conflict depends, of course, on whether the decisions generated by the system are consistent with each other and with the demands of the external environment. In our theory consistency is facilitated by two characteristics of the decision process: (1) acceptable-level decision rules; (2) sequential attention to goals."

The problem of goal and decision outcome conflict made reference to will be dealt with in detail in a later section on critical variables, however it is noteworthy that the facilitating characteristics alluded to are consistent with the cybernetic approach to decision-making.

The second purpose served by organization structure, within a functional area of specialization, is to develop strategies and procedures for dealing with specific decision situations. Simon recognized that even detailed, routinized planning activity, e.g. as in long-range budget formulation, only represents a strategy within which the actual decision maker operates, rather than a fixed program, and that specific activities within the strategy are performed in response to signals and stimuli of one sort or another. Thus, in his words:⁶²

"1. ... activities of the organization may belong to well-defined, highly routine types, but the occasion for the performance of any particular activity may depend on environmental stimuli--'instructions,' 'information' and what not.

"2. ... often, not even the contingent programs of activities is given in advance; that in fact, one of the important activities that goes on in organizations is the development of programs for new activities that need to be routinized for day-to-day performance."

⁶²Simon, p. 26.

It is precisely this latter activity that is the second purpose of organization structure. The split-axis system displays this general activity in terms of the categorization of decision dimensions of the situation.

The significance of the third purpose of organization structure, communication of decision dimensions to the decision maker, is that "it is useful to view composite decision from the standpoint of the individual who makes a decision in order to see (a) how much discretion is actually left him, and (b) what methods the organization uses to influence the decisional premises he selects."⁶³ In general, this involves the combination of both formal and informal means of communicating the appropriate stimuli to the decision maker in order to elicit a categorization of the decision situation consistent with that desired in organizational terms, i.e., by organization structure. The operating assumption is that "a stimulus, external or internal, directs attention to selected aspects of the situation to the expulsion of competing aspects that might turn choice in another direction."⁶⁴ The validity of the assumption, and particularly of specific stimuli employed organizationally, is a function of the experience of the decision maker, i.e., if he has learned the "correct" response (in organizational terms) to the stimulus. His inclination to do so is predicted by Simon:⁶⁵

⁶³ibid., p. 222.

⁶⁴ibid., p. 90.

⁶⁵ibid., p. 91.

"It appears, then, that in actual behavior, as distinguished from objectively rational behavior, decision is initiated by stimuli which channel attention in definite directions, and that the response to the stimuli is partly reasoned, but in large part habitual. The habitual portion is not, of course, necessarily or even usually irrational, since it may represent a previously conditioned adjustment or adaptation of behavior to its ends."

The difficulty of this process arises in execution since "a stimulus may have unanticipated consequences because it evokes a larger set [frame of reference] than was expected, or because the set evoked is different from that expected."⁶⁶

In summation, the role than of organization structure is one of developing the framework within which the actual decision maker arrives at a decision outcome, or alternative. Thus, "organizational influence upon the individual may then be interpreted not as determinations by the organization of the decisions of the individual but as determination for him of some of the premises upon which his decisions are based."⁶⁷

The premises organization structure seeks to impose on the decision maker are those relating to the definition of the decision situation. In organizational terms, it is desired that the decision maker perceive the problem related to the decision situation in the light of organizational goals and that the alternatives he considers as decision outcomes be consistent with organizational procedures. In Cyert and March's words:⁶⁸

⁶⁶ *ibid.*, p. 35.

⁶⁷ *ibid.*, p. 123.

⁶⁸ Cyert and March, p. 116.

"Choice takes place in response to a problem, uses standard operating rules, and involves identifying an alternative that is acceptable from the point of view of evoked goals."

Thus, the combined functions of identifying decision dimensions, designing procedures and communicating both to the decision maker can be classified as the function of premise formulation. In the process of carrying out these activities, organization structure absorbs, or reduces, environmental uncertainty. Simon and March described uncertainty absorption as taking place when "inferences are drawn from a body of evidence and the inferences, instead of the evidence itself, are then communicated."⁶⁹ They pointed out the critical relationship that the actual level at which uncertainty absorption takes place bears with respect to the decision-making process.⁷⁰

"Whatever may be the position in the organization holding the formal authority to legitimize the decision making, to a considerable extent the effective discretion is exercised at the points of uncertainty absorption."

Particularly in cases where the decision situation has high significance for the organization, organizational structure seeks to define the situation and appropriate responses and impose them in a top-down manner, i.e., as indicated in the split-axis system of Fig. 3. In a similar manner, the subordinate decision maker perceives the dimensions of the decision situation within the framework of the formal organization's premise formulation, i.e., "individual choice takes

⁶⁹ Simon and March, p. 165.

⁷⁰ ibid., p. 167.

place in an environment of 'givens'--premises that are accepted by the subject as basis for his choice; and behavior is adaptive within the limits set by these 'givens'.⁷¹ However, within this framework, the definition of the decision situation is subject to a second level of screening; this is the level at which decision dimensions are evaluated not in organizational terms, as in the organization structure set of axis, but in terms of both organizational and non-organizational values held by the individual decision maker. Thus his decision outcome and its implementation are subject to secondary screening which may result in a different evaluation of decision dimensions than that arrived at when considering organizational values only. As a consequence, in organizational design or policy formulation, the top-down effect is dominant but in implementation the bottom-up effect is critical. The effect of this secondary level of screening is shown in Fig. 3 by the inclusion of the bottom-up arrow. This perspective is helpful in understanding an inevitable source of organizational conflict. Where organizational significance is high in the decision situation, the organization desires its decision makers to perceive the high significance and respond in a manner favorable to the organization, i.e., to see a common interest and act accordingly. This outcome is enhanced if the significance for the decision maker is correspondingly high. As a consequence, in most organizations those decision makers who deal constantly with high significance decision situations are

⁷¹Simon, p. 76.

better "taken care of" than those who deal with low significance decision situations. This is in fact the standard technique organizations employ to generate a linkage between high organizational significance and high significance for the decision maker. This technique represents a necessary but not sufficient method of linking organizational and individual interests. A continuing and predictable source of frustration in organizations is the decision maker's effort to make the process flow in the opposite direction, i.e., to define dimensions from the bottom-up in the split-axis system, under certain circumstances. While it seems reasonable for organizations to expect its decision makers to accept the primacy of organizational considerations when organizational significance is high in the decision situation, particularly when the decision maker's corresponding significance is either high and complimentary or low, it strains expectations when organizational primacy continues to be required when organizational significance is low but the decision maker's significance is high. It is in this case, in particular, that the decision maker seeks to operate from the bottom-up and yet, most organizations do not structure the flexibility to permit this. More on this subject will be addressed in the section discussing the role of critical variables in the decision process. The dominance of the top-down view taken by organization structure results from the reliance on the rational approach. Scott has pointed out:⁷²

⁷²Scott, p. 6.

"The classical point of view holds that work or tasks can be so organized as to accomplish efficiently the objectives of the organization. An organization is viewed as a product of rational thought concerned largely with coordinating tasks through the use of legitimate authority. It is based on the fundamental and usually implicit assumption that the behavior of people is logical, rational, and within the same system of rationality as that used to formulate the organization."

Clearly the split-axis system rejects this latter assumption by proposing that different cognitive processes, i.e., rational and cybernetic, underly the two set of axis of the system. This leads to an examination of the role of the decision maker's set of axis.

2. The Role of the Decision Maker

As pointed out above, organization structure has as a basic function the definition of the decision situation; "...the definition of the situation represents a simplified, screened, and biased model of the objective situation, and filtering affects all of the 'givens' that enter into the decision process."⁷³ Additionally, by means of information, cues and stimuli transmitted through formal and informal communication channels, organization structure guides the decision maker in the evaluation of specific decision dimensions. However, the decision maker's perception of the decision situation is subjective and carried out in the light of non-organizational as well as organizational values. Even in the case where organizational values dominate his perception, the screening of

⁷³ March and Simon, p. 154.

organizational information, cues and stimuli that the decision maker necessarily carries out in his subjective definition of the situation is subject to unintended organizational ambiguity. As pointed out by Simon in reference to selective perception:⁷⁴

"Presented with a complex stimulus, the subject perceives in it what he is 'ready' to perceive; the more complex or ambiguous the stimulus, the more the perception is determined by what is already 'in' the subject and the less by what is 'in' the stimulus."

In view of the decision maker's key role of arriving at a decision outcome as a result of subjectively evaluating decision dimensions within the framework provided by organization structure, a discussion of some of the considerations impacting on his perceptions is warranted. The phenomenon considered here is that the perception of decision dimensions, (i.e., significance, time, and precedence), does not occur simultaneously or independently. Stated another way, due to the particular circumstances surrounding a decision situation and to the processes of formal and informal communication, one of the three dimensions will be emphasized and evaluated first in a sequence of ordered perceptions, establishing its dominance over the other two dimensions and having an impact on their subsequent relative positioning. The possible combinations of ordered perceptions and predicted impact are as follows:

1. If the significance dimension is perceived first (call this dominance of significance) and is evaluated as:

⁷⁴Simon, p. 309.

- a) high - then both the time and precedence dimensions will be positioned lower than they otherwise would be;
- b) low - then time will be positioned higher than it otherwise would be.

2. If time is dominant and:

- a) high - then significance will be lower;
- b) low - then significance will be higher while precedence will be lower.

3. If precedence is dominant and:

- a) high - then significance will be lower while time will be higher;
- b) low - then significance will be higher while time will be lower.

The consequence of ordered perceptions is that the decision maker's subjective categorization of the same decision situation and his subsequent response will vary as a function of the order and emphasis of the organizational information and cues communicated to him. It is not within the scope of this paper to attempt experimental validation of the existence and effect of ordered perceptions. The concept of ordered perceptions is offered as an example of the potential value of the split-axis conceptual framework; not only does the approach put forth three dimensions for decision situations, it also hypothesizes relationships between them.

The split-axis system for describing the organizational decision process possesses the potential for encompassing and explaining within its framework a wide range of organizational phenomenon described by earlier writers. As pointed out in the introduction, the scope of this paper does not permit an exhaustive pursuit of this area, however some examples are offered in order to show how some previously unrelated observations can be grouped within the conceptual framework of the split-axis approach.

March and Simon offered the following set of propositions in support of their general perspective:⁷⁵

"We can cite two factors that affect the propensity of organization members to engage in activity. First, the greater the explicit time pressure attached to an activity, the greater the propensity to engage in it. The stimulus of deadlines tends to direct attention to some tasks rather than others. Second, the greater the clarity of goals associated with an activity, the greater the propensity to engage in it; ..."Gresham's Law" of Planning: Daily routine drives out planning... When an individual is faced both with highly programmed and highly unprogrammed tasks, the former tend to take precedence over the latter even in the absence of strong over-all time pressure."

These propositions relating to the behavioral impact on rational expectations can readily be couched in terms of the split-axis system. The first proposition about the effect of time pressure reflects conclusion 2b) under the discussion of ordered perceptions. When operating under the pressure of a deadline, the decision maker subjectively increases the significance of the decision situation. The effect may easily

⁷⁵March and Simon, p. 185.

be to increase subjective significance above the level of objective or organizational significance of competing decision situations which have no deadline but still require the decision maker's attention, i.e., the urgent drives out the important. In the second proposition, clarity of goals can be associated with the decision maker's subjective perception of high significance in the decision situation. As a consequence of proposition 1a) under ordered perceptions, this implies a subjective lowering of the time dimension, i.e., an artificial increase in time pressure, with the consequence noted in the previous proposition. In proposition three, if programmed tasks are associated with high precedence while unprogrammed tasks are associated with low precedence, then "Gresham's Law" can be explained in terms of the higher uncertainty reduction associated with precedence, i.e., people do first what they know how to do and avoid tasks or decisions that they are unsure how to deal with, even though the unprogrammed task may have higher organizational significance.

Neustadt's observations about Presidential priorities are consistent with the interaction of the time and significance dimensions of the split-axis system:⁷⁶

"A President's priorities are set not by the relative necessity for him to do it. He deals first with the things that are required of him next. Deadlines rule his personal agenda..."

⁷⁶ Neustadt, p. 155.

"What makes a deadline? The answer, very simple, is a date or an event or both combined...Dates make deadlines in proportion to their certainty; events make deadlines in proportion to their heat. Singly or combined, approaching dates and rising heat start fires burning underneath the White House. Trying to stop fires is what Presidents do first. It takes most of their time.

"...The choices lacking dates or heat may end in others' hands or be precluded by events; the choices he takes first may be distorted by their urgency."

This description by Neustadt is equally applicable to the developing area in administrative theory known as crisis management.

The intent in citing these examples is to point out that the split-axis system offers a general conceptual framework within which a variety of diverse approaches can be compared with some continuity; e.g. basically, the classical theorist's position can be seen in the top-down perspective of the organization structure set of axis whereas the neoclassicist's arises in the bottom-up impact of the decision maker's set of axis.

3. Special Considerations

Two aspects implicit in the perspective of the split-axis system are deserving of explicit consideration: (a) the role of information and (b) the role of the decision maker as a representative of organization structure.

a. The role of information in organizational decision-making in the split-axis system assumes the validity of the

following assumption: Associated with any environmental problem which generates a decision situation for the organization are two types of information: (1) instrumental information; and (2) organizational information. Instrumental information is simply the rational or technical information associated with the problem, i.e., the "internal" facts of the problem. Organizational information is that which is associated with the decision dimensions in the split-axis system, i.e., how important is this problem, how soon must a decision about it be made and how has this problem been dealt with in the past? The rational model dictates that the decision process should be a function of instrumental information, however the split-axis system proposes that organizational information dominates the organizational decision process.

b. The second assumption implicit in the split-axis system is somewhat more tenuous. All too often when organization theorists address their field, statements such as "The organization wants..." or "Organization structure does..." are encountered without further amplification; similar statements have been made in this paper. However, in spite of the fact that organizations are synergistic, i.e., the whole is greater than the sum of its parts, it still makes little sense to picture the organization as a rational entity consciously pursuing certain ends. Particularly in an area where the relationship between organizational structure and the organizational decision maker is being examined, the assumptions

underlying the operating nature of organizational structure need to be explicit. In the split-axis system the assumption is made that for any specific decision situation, organization structure is represented by a specific decision maker. While this assumption would seem to create two sets of axis, both labelled "decision maker" rather than one labelled "organization structure" and the other labelled "decision maker," the validity of choosing one decision maker to represent organization structure and characterizing him as operating under organizational norms is supported by two factors. First, as pointed out by Simon:⁷⁷

"The values and objectives that guide individual decisions in organizations are largely the organizational objectives--the service and conservation goals of the organization itself. Initially, these are usually imposed on the individual by the exercise of authority over him; but to a large extent the values gradually become 'internalized' and are incorporated into the psychology and attitudes of the individual participant."

The rational aspect of this reference is mitigated by the qualification "largely" and insofar as the decision maker operates rationally the perspective offered is useful. The nature of the qualification in the above reference is addressed by Snyder, Bruck and Sapin:⁷⁸

"Any competence in any decisional unit will have what we have called prescribed and conventional aspects. Within these there will be a minimum set of rules and requirements which would be binding on any occupant. In other words, it is possible to isolate dimensions of the role (in our vocabulary, sphere of

⁷⁷ Simon, p. 198.

⁷⁸ Snyder, Bruck and Sapin, p. 167.

competence) of Secretary of State which would persist regardless of the particular person who is actually filling it. However, beyond this conventional boundary it is largely a matter of individual interpretation and discretion on the part of the occupant as to what is done and how."

These references in combination support the perspective that a decision maker acts as a representative of organization structure insofar as he acts in a manner rationally consistent with organizational norms and within his "sphere of competence."

The second factor supporting the assumption is the perspective taken in nested environments that in operating in the split-axis system in the top-down direction, the decision maker representing organization structure is guided by the rational approach; this is precisely the condition required in the preceding paragraph.

4. Summary of Split-Axis Approach to Communication of Decision Dimensions

This section has emphasized the following key elements in the conceptual framework:

a. Problem areas in the external environment of organization structure are the source of organizational goals and corresponding decision situations.

b. Organization structure has three primary tasks with respect to the decision-making process:

(1) to define the decision dimensions of the decision situation in organizational terms;

(2) to design standard procedures for dealing with different decision situations;

(3) to communicate the organizationally defined decision dimensions to the actual decision maker and, by implication, designate the appropriate response.

c. The organizational functions in b. are carried out by organizational decision makers acting as representatives of organization structure, or norms, operating in a "top-down", hence rational direction.

d. In responding to information, cues and stimuli directed towards him by means of formal and informal communication channels, the decision maker selectively perceives the dimensions of the decision situation in the light of both organizational and non-organizational values. Organizational information (not instrumental information) is the dominant factor in evaluating decision dimensions in organizational terms. His definition of the decision problem, potential solutions and final decision outcome are a function of his subjective perception of decision dimensions.

At several points in this section, goal and value conflicts were encountered as predictable characteristics of the organization. A discussion of the role of critical variables in explaining this phenomenon has been deferred; its consideration constitutes the last component of the split-axis system.

D. THE ROLE OF LINKED CRITICAL VARIABLES

The split-axis system has been used to describe the method by which the organization communicates decision dimensions to the decision maker; the linked critical variable approach provides a means of evaluating the effectiveness of both the communication process and the consequent decision choices.

The considerations addressed in this section are those pointed out by Cyert and March:⁷⁹

"Basically, we need information on two points: we need (1) to examine the effect of differing goals on the estimations prepared by individual members of the organization, and (2) to consider the net organizational effect of an information system operating under partial conflict of interest."

In the perspective developed by the split-axis system, problem areas in the task environment generated organizational goals. The dimensions of decision situations associated with problems or goals were communicated formally and informally via organization structure to the actual decision maker. The decision maker then evaluated these decision dimensions subjectively and arrived at a decision outcome. In this process, the problem of organizational values conflicting with the values of its decision makers was alluded to but not addressed in detail. The impact of these respective values is observable in the selection and evaluation of the

⁷⁹ Cyert and March, p. 67.

variables associated with the decision situation. Previous writers have addressed the relationship between goals and values in terms of decision-making variables:⁸⁰

"We have argued that we can analyze the process of decision-making in the modern firm in terms of the variables that affect organizational goals, the variables that affect organizational expectations, and the variables that affect organizational choice...The first set influences the dimensions of the goals (what things are viewed as important). Within this set of variables, we can cite the composition of the organizational coalition, the organizational division of labor in decision making, and the definition of problems facing the organization. Thus, we have argued that organizational goals change as new participants enter or old participants leave the coalition. We have argued that the operative goals for a particular decision are the goals of the subunit making that decision. Finally, we have argued that goals are evoked by problems. The second set of variables influences the aspiration level on any particular goal dimension. Here we have identified essentially three variables: the organization's past goal, the organization's past performance, and the past performance of other 'comparable' organizations. The aspiration level is viewed as some weighted function of these three variables."

In an approach to goals, or values, similar to Cyert and March's, Snyder, Bruck and Sapin adopted the following perspective:⁸¹

"Given identified, authoritative decision makers, an organizational system, and a communication network (internal and external), decision making consists in the combination of values + attitudes + information + perception + situation into the choice of a course of action. Another formulation is: a decision results from the interrelating of value and situation with attitudes, perception, and information serving a two-way mediating function. In this process values are clarified; the question of what values are threatened by an

⁸⁰ Cyert and March, p. 115.

⁸¹ Snyder, Bruck and Sapin, p. 243.

event is raised and answered. Value relevancy is established by a 'reading' of the situation and by calculation of the consequences for particular values of a certain state of affairs. The protection of values depends upon the specification of a concrete objective and a strategy for achieving the objective."

These referenced approaches to the problem of goals and values are useful in obtaining a broad framework for understanding but suffer from the complexity incurred by employing many variables and from the wide scope. While fundamentally in agreement with the above perspectives, the discussion of critical variables in this approach seeks to simplify the range of variables considered and to be more specific about the relationships between variables.

The concept developed here of critical variables in the process of organizational decision making derives from the cybernetic approach. As pointed out in the section on nested environments and in Fig. 3 on the split-axis system, in dealing with the external environment, i.e., the bottom-up or outward perspective, the decision process is characterized by the cybernetic model. Critical variables arise in the manner pointed out by Steinbruner:⁸²

"Ashby's decision maker is presumed to make no calculations about the outcome of his action at all and to attach no pay-off value in advance to any alternative action. The Ashby decision maker harbors a repertory of behaviors which it performs in some ordered sequence. The sequence is not so much related to the problem at hand as it is to past experience. This decision maker monitors a small set of 'critical variables'

⁸²Steinbruner, p. 63.

and his values consist in keeping these variables within tolerable ranges. The effect of any given action on this set of critical values is discovered only after it occurs."

Steinbruner supplements Ashby's approach for simple cybernetic systems with observations derived from cognitive theory in order to extend the perspective to complex organizations.⁸³

"For the two-value trade-off problems, the cognitive structure required to make the trade-off explicit violates the principle of consistency. Under the assumptions of cognitive theory, the information processing mechanisms of the mind operate to deny the trade-off relationship unless compelled to recognize it by a highly structured external situation (the reality constraint). Under uncertainty, the reality constraint is weakened, and the cognitive criterion of consistency forces a mental dissolution of the trade-off. Cognitive principles thus suggest the contrary assumption of value separation. According to this assumption, the two values of a complex problem will not be related to one another in the mind of the decision maker, but divided and pursued separately, as if they were independent considerations. The information processing operations of the human mind strain to set up single-value decision problems."

This conclusion provides the theoretical foundation for the discussion of critical variables in the split-axis system. This perspective proposes that problems in the external environment, which generate organizational goals and decision situations, have associated with them critical variables. The critical variable associated with a problem, or decision situation, is the index by which the current status of the

⁸³ ibid., p. 108.

problem area is evaluated, thus setting up Steinbruner's single-value decision problem. This view is supported by Simon's observation:⁸⁴

In the decision-making situations of real life, a course of action, to be acceptable, must satisfy a whole set of requirements, or constraints. Sometimes one of these requirements is singled out and referred to as the goal of the action."

The most obvious example of this practice is the widespread use of measures of effectiveness (MOE's) in the decision process. MOE's are one type of critical variable; Thompson explained their function in the following case:⁸⁵

"...discharge rates and average costs for a hospital are critical indicators, not because they are measures of the quality of care, but because they are especially visible criteria from which improvement, historically or in comparison with others, can be shown."

The role of linked critical variables in the split-axis system can be pictured (see Fig. 4) in terms of the three basic elements of the organizational system: environment, organization structure and the decision maker. The proposition here is that for any given decision situation, each organizational element associates a critical variable with the problem, or goal. The critical variable employed by an element reflects the dominant value affected by the decision situation. Decision outcomes are evaluated in terms of their effect on

⁸⁴ Simon, p. 262.

⁸⁵ Thompson, p. 91.

critical variables and, by implication, on the dominant value for that element. The desired effect of decision outcomes is to maintain critical variables within satisfactory ranges, i.e., to exercise control over critical variables and reduce uncertainty with respect to fluctuations. The links between critical variables indicate that for a particular decision outcome to be favorable to the organizational system as a whole, a complementary relationship must exist between the critical variables of the elements, i.e., the consequences of the decision maker reducing uncertainty with respect to the critical variable in his environment (CV_3) must be directly linked to the organization's critical variable (CV_2) which in turn must have the desired environmental effect (on CV_1). Fig. 4 is simplified, as was Fig. 1, to show only one series of interactions. However recalling the concept of hierarchical nested environments, it is clear that between each level there would be a corresponding set of critical variables. The more intermediate critical variables there are between the level of the decision maker and the task environment of the organization, the more difficulty there is in establishing complementary, i.e., effective, linkages between them. For discussion purposes, the simple system used in Fig. 4 will be used.

A complementary linkage exists between two critical variables in two ways: (1) when they are identical and (2) when they are directly linked. The first case is simply where

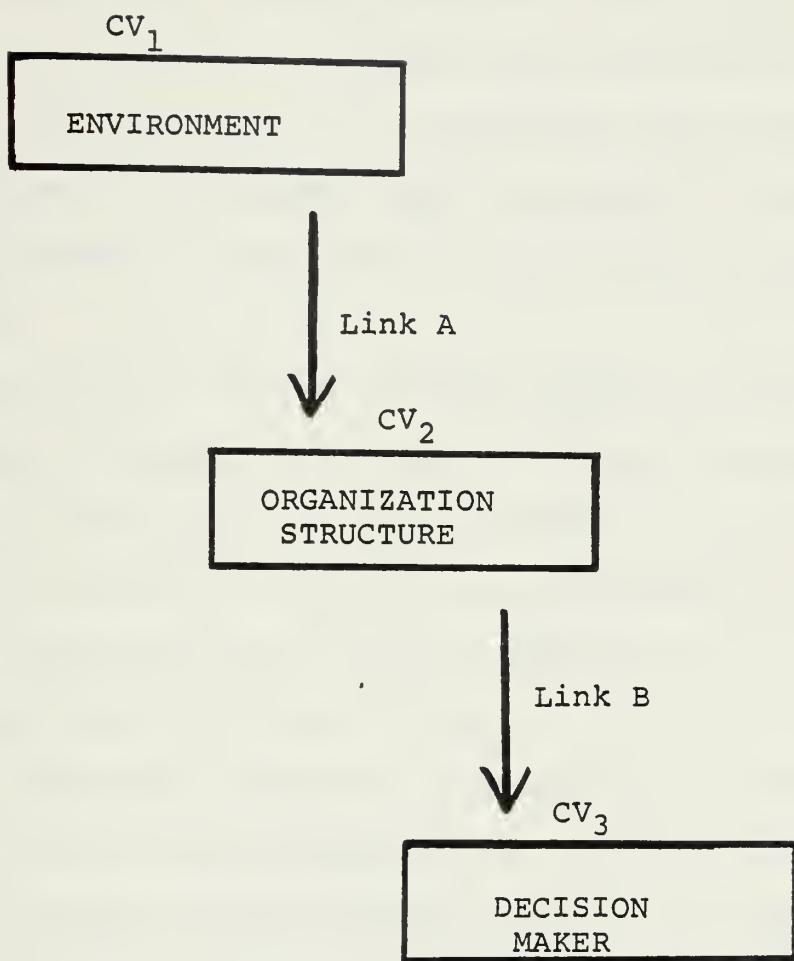


FIG. 4 Showing Organization Element Critical Variables (CV_1 , CV_2 , CV_3) associated with a given decision situation.

two of the elements, e.g. organizational structure and the decision maker, use the same operative critical variable in evaluating the decision situation and alternative decision outcomes, i.e., $CV_2 = CV_3$. In the second case, although the variables are different, they are directly related (linked), i.e., an increase in one causes an increase in the other ($CV_2 \rightarrow CV_3$).

Alternatively, inverse linkage between critical variables exists when a change in one causes a change in the opposite direction of the other, i.e., an increase in CV_2 causes a decrease in CV_3 ($CV_2 \not\rightarrow CV_3$). It is also possible to have neutral linkage between critical variables, i.e., a change in CV_2 simply has no effect on CV_3 .

This conceptual framework of critical variables permits a consideration of two possibilities for the evaluation of the effectiveness of the decision process in a given organizational decision situation: (1) complementary linkages, i.e. consistency in values between organizational elements and (2) a breakdown in linkages, i.e., conflict in values.

1) Consistency in critical variables may arise in three differing scenarios depending upon the dominance of CV_1 or CV_2 or CV_3 :

- a) Environmental based critical variable ($CV_1 \rightarrow CV_2 \rightarrow CV_3$): This situation is driven by a dominant CV_1 . The actual critical variable

will tend to be a generally accepted environmental source variable for the type of organization involved. (E.g., for a commercial firm, variables such as profit and market share are generally accepted standards of performance.) They are of sufficiently uniformly high significance to all system elements to cause them to be acceptable critical variables for all three elements in many decision situations. While frequently taken to be goals in themselves, they are actually indicators of how well the organization is reducing uncertainty in its environment. (E.g., profit in a commercial firm is largely a function of its ability to reduce uncertainty with respect both to its inputs, i.e., reliable and cost effective supplies, and its outputs, i.e., markets. The attainment of profits indicates it is doing so.) Consistency from CV_1 dominance is observable when all elements are responsive to the environmental critical variable.

- b) Organizationally created critical variables ($CV_1 \leftarrow CV_2 \rightarrow CV_3$): This case is driven by a dominant CV_2 . An organizationally generated critical variable typically delineates the categorization of environmental CV_1 's and

CV_3 's for the decision maker in accordance with organization policies. (E.g., this is most easily seen in bureaucracies; if the poverty level is defined as annual income below some fixed amount by HEW, then that amount becomes a critical variable in the environment with respect to clients, i.e. CV_1 , and also becomes a critical variable for HEW decision makers, i.e. CV_3 , in certain decision situations.) As compared to the previous case, the environmental CV_1 created here is artificial, i.e., it has meaning in organizational terms but may be inconsistent with "real" CV_1 's perceived by extra-organizational elements, hence the frequent frustration of clients in dealing with bureaucracies.

- c) Decision maker created critical variable ($CV_1 \leftarrow CV_2 \leftarrow CV_3$): This situation is driven by a dominant CV_3 . It is characterized by the phenomenon of a solution looking for a problem. It may operate when the pet project of a decision maker (with its corresponding, artificially created CV_3) gains organizational acceptance (creating a CV_2) and consequently creates a CV_1 (as in the bureaucratic case). Alternatively the CV_3 may jump the CV_2 step and first generate a

CV_1 then work backwards. (E.g., this may be the case when a decision maker is able to direct organization perception towards a previously ignored CV_1 , i.e., detente, human rights, public opinion polls, "creation" of product demand in advertising.)

These possible situations for arriving at consistency of critical variables bear some resemblance to Allison's three models of the decision process:⁸⁶ case a) corresponds to Allison's rational model, b) to his bureaucratic model and c) to the political model.

2) Breakdown of linkages between critical variables can happen at two points in the simple model of Fig. 4:

- a) $CV_1 \neq CV_2 \rightarrow CV_3$: in this case although organization structure and the decision maker are directly linked, there is no effective linkage to the environment. This simply indicates the potential for the absence of internal organizational conflict in conjunction with ineffective policy.
- b) $CV_1 \rightarrow CV_2 \wedge CV_3$: in this case, direct linkage between the environment and the organizational variable is negated by goal or value conflict between the organization and the actual decision maker.

⁸⁶ Allison, G. T., "Conceptual Models and the Cuban Missile Crisis"

E. SUMMARY OF SPLIT-AXIS SYSTEM

The conceptual framework constructed by means of the split-axis approach has four basic components:

1. Nested environments - This component depicts the dynamic, problem-specific interaction of a segmented task environment with a hierarchically and functionally differentiated organizational structure in which individual decision makers are separated from the organization's task environment by one or more levels of organization structure and hence have organization structure itself as their external environment.

2. Decision situation typology - The categorization of decision situations in terms of decision dimensions, i.e., significance, time and precedence, is representative of organization structure's role in dealing with recurring environmental problem areas by standardizing general organizational decision procedures and appropriate responses.

3. Communication of decision dimensions in the split-axis system - This component portrays organization structure's function of communicating decision dimensions to the actual decision maker and his subsequent subjective perception of those dimensions. Additionally, the hypothesis is advanced that organization structure is characterized by norms of rationality in the top-down direction whereas the decision maker perceives and evaluates cybernetically in the bottom-up role.

4. Role of Critical Variables - The problem of value conflict between the organization and its decision makers is addressed by this component. The possible types of linkage, i.e., direct, inverse and neutral, are addressed and the requirement for direct linkage between organizational elements (i.e., CV_1 , CV_2 and CV_3) for an effective decision process is hypothesized.

The conceptual framework deriving from the split-axis approach is intended to allow for the useful analysis of multiple types of decision situations in a variety of types of organizations. Its relative usefulness is subject to the following considerations:

(1) As noted in an earlier section, the discussion of organizational decision-making has been clouded by the wide range of variables impacting on the decision process. The conceptual framework developed in this paper deals with this problem by simplifying the range of situational variables that need to be considered. Essentially, there are nine primary variables which need to be identified and evaluated in the split-axis system; three variables (the decision dimensions) for each set of axis and three critical variables. This represents a vast reduction in the number of significant variables that must be considered.

(2) The evaluation of identified variables presents a more troublesome aspect. The organization structure

dimensions are somewhat easier to evaluate in that they are rationally determined in the light of organizational values only. However due to the subsequent subjective interpretation of decision dimensions by the actual decision maker, evaluation of the dimensions on his set of axis is more tenuous for the analyst. The measurement problem is further complicated by the role of both formal and informal communication channels used by organization structure to translate decision dimensions to the decision maker. For example, in evaluating the precedence dimension perceived by the decision maker, it is possible to examine what formal information, cues and stimuli were directed to him by organization structure, e.g., by observing whether written SOP's apply to the decision situation; by measuring the frequency of past occurrences of the same or similar decision situations, etc. However, determining the impact of informal communication, e.g., a phone call from a superior, is extremely difficult in that there is seldom any reliable record kept of their occurrence. Potentially, interviews or questionnaires might be used to try and gain insight into the effect of informal factors in the evaluation of a specific decision dimension in reconstructing a particular decision situation. Thus, in reconstructing a past decision outcome in terms of the split-axis system there may be insurmountable problems when informal factors critically effect the decision maker's choice. Unfortunately, obtaining

his explanation after the fact is not reliable since the reasons he might give for a particular decision after the consequences are known may significantly differ from the reasons perceived at the time the decision is made; e.g., in the case of Watergate, in spite of the unusually large amount of documentation and attention the decision situation has had, there are aspects of the decision process which will probably never be accurately reconstructed. This condition is somewhat ameliorated in examining an on-going decision process in that the analyst can potentially observe the effect of many, if not all, informal factors.

In order to clarify the concepts and operation of the split-axis system, the next section will offer an expanded example. Emphasis on the role of linked critical variables will be apparent in this particular application; however, the other components of the split-axis approach will be addressed. In addition, the use of this lengthy example will serve to indicate a suggested methodology for applying the split-axis system to case studies.

VII. APPLICATION OF SPLIT-AXIS SYSTEM TO THE CASE OF
MOLECULAR COMPOUNDS CORPORATION (MOCOM)⁸⁷

The case employed for application of the split-axis approach is somewhat lengthy but has been included in its entirety even though more than half of the information is irrelevant in the subsequent analysis. This extraneous information is included intentionally in order to indicate the information screening capability the split-axis system offers for analysis. This choice has been made in light of the fact that decision makers are not given relevant information only; they also have to decide what information is pertinent to the problem or decision situation they face and they frequently lack a conceptual framework for doing so.

The Molecular Compounds Corporation (MOCOM) manufactured a wide variety of products in the chemical field and related areas, ranging from industrial chemicals through consumer goods. During the 1950's MOCOM's sales had grown over 60%, reaching a level in excess of \$700 million in 1962. Net income had withstood the pressures of competition within the

⁸⁷ This case is taken from the text "Basic Business Finance" by Hunt, Williams and Donaldson; it was used as the core reference for a course in decision-making for financial management. The case was used to supplement that portion of the course dealing with capital budgeting. Exhibits of financial statements have been deleted since they are of tangential interest only in this discussion.

chemical industry, with the result that per share earnings had also risen about 60% during this time. This rise occurred despite additional profit erosion caused by increased depreciation charges and higher allocations for research and development. The corporate executive group was extremely anxious to match or exceed this growth record in the decade from 1960 to 1970. Toward this end, it had instructed the Central Financial and Planning Staff to reevaluate the methods of financial analysis to insure that adequate investments were being made.

The fundamental objective of the company's current capital budgeting process was to maximize corporate growth and especially growth of earnings per share. This objective would permit the payment of a fair and, it was hoped, growing dividend to stockholders; and, subject to the vagaries of the stock market, it would create conditions favorable for significant capital appreciation.

Developments in the chemical industry had contributed to executive concern about MOCOM's growth prospects. Recently, a number of successful, large firms (for example, Standard Oil Company [New Jersey], Goodyear Tire and Rubber Company, W. R. Grace and Company, and the Borden Company) had entered the field and had aggressively sought to share in the chemical and allied products market, which had sales of \$30 billion in 1961. There were already 10 firms, primarily in chemicals, with sales of over \$300 million and numerous smaller firms with significant

sales in narrower segments of the market. Each of these firms was tending to diversify further. Some of the substantial postwar expansion had led to overcapacity. All this meant increased competition among giants for available demand. In particular, price cutting in established products had squeezed margin considerably without generating much new volume. Sales and earnings also seemed likely to become more volatile, especially as foreign competition became more important. The greatest hope for the achievement of corporate goals was seen in the development and rapid exploitation of new products (including product improvement).

At the same time, the industry was becoming increasingly mature. Some segments still retained the dynamic growth patterns that had been evident during the introduction of petrochemicals and plastics. However, more firms were spending more on research to achieve a strong position in these fields, and existing competitive advantages were proving more tenuous. In total, the balance had shifted toward a higher proportion of products with limited prospects for growing demand.

These factors led MOCOM's top management to conclude that it would be necessary to secure full and effective utilization of available capital resources if the firm was to achieve continued rapid growth. The increased size and complexity of MOCOM's operations, however, made such an objective all the more difficult to achieve. A recent drop in the amount

of capital expenditures submitted for approval had thus been the cause of considerable concern.

Partially because of these considerations, the members of MOCOM's Central Financial and Planning Staff were considering a revision in the company's budgeting procedure in early 1962. In their judgment, the most significant revision would eliminate the 12% (after-tax) minimum return on investment criterion or "cut-off" rate. This rate had been used to evaluate all projects since the existing procedures had been introduced in the middle 1950's. The essence of the argument for elimination of the rate was that the existing system was overstructured. For example, some executives argued that a cutoff rate tended to discourage submission of low-return but relatively riskless projects in which MOCOM could profitably invest. In short, the elimination of the artificial restraint of a cutoff rate might encourage operating personnel to submit any project that appeared worthwhile.

Other members of the Planning Staff, however, thought that a cutoff rate (preferably 12%, but certainly no lower than 6% or 7%) was essential as a management tool. They believed that with no formal guideline the divisions would create their own rules and procedures, many of which would be more stringent than the 12% rate currently set by the corporation. There remained, however, considerable disagreement as to just what cutoff rate should be used and how it should be administered in order to stimulate satisfactory growth.

A. DECENTRALIZED MANAGEMENT

MOCOM was organized into 11 autonomous divisions. Each division was self-supporting and contained its own staff groups, including a Financial and Planning Staff. Division executives were held responsible for planning the course of their divisions and for operating them successfully. Although plans and problems were discussed regularly with headquarters' personnel, central management's greatest influence arose through performance appraisal. Performance was evaluated by a number of financial methods as well as by less formal factors. Top corporate management considered, for example, a division's return on investment (operating income, less an allocation for corporate overhead and for depreciation on the division's assets, divided by the sum of gross fixed investment and gross working capital), its operating percentages (income as a percentage of sales, etc.), and growth trends.

Through these evaluations, top management communicated its desires and criticisms in ways, sometimes subtle, that appeared to have a profound effect upon divisional attitudes and orientations. While unquestionably misinterpretations and other misunderstandings arose, top management considered that this planning system worked more successfully than would a more formal set of policies, goals, and operating directives. Nevertheless, the influence of performance evaluations on subsequent actions was a cause for modest concern because of

the difficulty of comparing actual success against relative differences in available opportunities.

Any adjustments in the capital budgeting process would have to take existing division-headquarters' relationships into account.

B. EXISTING CAPITAL BUDGETING PROCEDURES

Although each division was responsible for generating projects, all divisions were expected to abide by the 12% cutoff rate, which was applied by the divisional financial analyst following procedures set by the Central Financial and Planning Staff. Projects below that rate were actively discouraged and usually rejected, even though they required less than \$150,000 and could consequently be approved by division management without central management review.

About 40% of the corporation's total capital expenditures were included in the division budgets and were not reviewed by headquarters, although this percentage varied from division to division. Only projects requiring an investment of more than \$150,000 were forwarded to the Central Financial and Planning Staff, which reviewed the request on behalf of the Capital Budget Review Committee. This committee, consisting of the corporation's president, the executive vice president, two divisional managers (including the originator of a project under discussion), and two Central Staff vice presidents, gave final approval to projects in excess of the size divisional

management could approve. In addition, if any project smaller than \$150,000 and returning less than 12% seemed particularly attractive, division management could request the Capital Budget Review Committee to waive the cutoff requirement.

The 12% cutoff rate had been selected after an extensive investigation by the Central Financial and Planning Staff, which considered a wide variety of possibly relevant considerations. The four most important were:

1. Growth expectations. Over the previous 50 years the company's earnings per share had increased 7% to 8% a year. It was assumed that the stockholders expected that this rate of growth would be maintained and in addition that a dividend yield of at least 3% would be provided. A combination of these two figures (dividends per share divided by market price, plus "growth") yielded a cost of equity capital of 10% or 11%. Twelve percent was selected to allow a slight margin for error in the budgeting process.

2. Cost of capital. From an actual balance sheet, a weighted average cost of capital, including debt (estimated interest charges) and equity (estimated earnings per share/market price), was calculated. This measurement turned out to be substantially lower than 12%.

3. Industry standards. Cutoff rates used by other companies in MOCOM's industries were investigated and found to be roughly around 12%.

4. Feasibility. Management believed that the 12% rate was quite practical, since it would not generate more projects than the firm could absorb. As there seemed to be no sound, rigorous basis for making the necessary final judgement, a 12% cutoff rate (after taxes) was accepted because it seemed about right.

The corporation also had installed a standard method of computing return on investment. After experimentation with several financial measures, management chose a net after-tax present-value technique. In this measurement present-valued cash outflows were subtracted from present-valued cash inflows (including an estimate for recovery) to arrive at a net present-value figure. From alternative investments, the one showing the highest net present value was selected, all other factors being equivalent. Other measurements, such as internal rate of return (that rate which makes the net present value equal to zero), after-tax return on gross investment, payback years in present-value dollar terms, and profits as a percentage of sales, were used as supplementary guides.

Forecasts were sometimes measured on an expected value basis. Division Planning Staff personnel were supposed to consider various alternative outcomes and calculated related cash flows. They then assigned probabilities to the flows and used the probabilities as weights to obtain an expected present-value figure. This adjustment was used to correct the "most likely" estimate when skewed probability distributions were observed.

C. PROBLEMS WITH THE EXISTING SYSTEM

The Central Financial and Planning Staff acted as consultants to the divisions in their planning and capital budget preparation, in addition to reporting to the corporate headquarters and providing the reports, plans, and analysis top management needed. Many of the analysts had worked in one or another of the divisions before they transferred to the Central Staff group. The members of the Staff thus considered themselves fairly familiar with the attitudes of the divisions and with the informal methods that existed on local levels to supplement the formal capital budgeting procedure.

As a result of their visits and work in the field, the Central Planning Staff began to suspect that the existing capital budgeting system was possibly choking off investments at the extremes of the opportunity spectrum. At the least, the planning group believed that too few low-risk, low-return and too few high-risk, high-return projects were being submitted to the Capital Budget Review Committee. For example, very few projects were ever submitted that were as low as the cut-off rate of 12%. The average internal return rate seemed to be between 17% and 20% on low-risk projects and went up much higher for any request that had a major risk associated with it.

Moreover, the Capital Budget Review Committee rarely rejected a project. "When one is rejected," an executive of the Central Staff remarked, "you can hear the anguished cries through the whole building." Some members of the financial

and planning group considered this situation evidence that few borderline projects were being submitted for top-level consideration. As a consequence top corporate management was unable to exercise significant influence on the allocation of funds within the company. "It's not the obvious investments that top management should consider," commented one analyst, "since anyone can decide these. They should be concerned with the marginal projects which are at present being screened out all along the line."

While it was less clear-cut, there was also evidence that very few projects were being rejected at lower echelons. This condition further suggested that only those projects which were relatively certain to receive final approval were even flowing into the beginning of the decisional pipeline. The criteria used by the divisions to screen possible attractive opportunities were not always known, but they appeared to be, often-times, more cautious than top management wished. The negative decisions, then, were commonly made at the source of the idea, at a level in the organization quite removed from direct communication with the Capital Budget Review Committee.

Equally important, screening criteria at intermediate levels were known to differ from division to division and probably from person to person. For example, a number of executives were known to use a cutoff rate of 15% based upon after-tax return on gross investment (a cutoff criterion

used within the company prior to 1956) in evaluation of projects. Unquestionably, other standards were employed wherever they seemed appropriate to individuals.

In composite, these negative decisions were probably quite significant. First of all, some executives were afraid that MOCOM might be underspending relative to its ability. MOCOM's top management believed that the company had sufficient sources of funds to support a substantial increase in the rate of plant expenditures. The company's debt-to-capitalization ratio ranged from 25% and 30%, well below levels considered safe. Management believed that the firm could borrow nearly \$100 million more at favorable interest terms. This potential source of funds, combined with a large after-tax income and a substantial depreciation throwoff, practically ensured that even extremely large capital budgets could be sustained over a number of years without recourse to common stock financing. Indeed, in recent years internally generated funds alone had proved adequate to meet normal dividend and capital expenditure demands for funds.

There was good evidence that many favorable opportunities were never submitted. For example, the question of the effectiveness of the capital budgeting system was raised in a dramatic way in 1960, when the limit on projects that could be included in division budgets changed from \$75,000 to \$150,000. The number of projects included in the division

budgets increased substantially, and it appeared that the dollar volume of projects requiring investments of between \$100,000 and \$150,000 would be about four times its previous level.

Top management's influence on the strategic balance of overall expenditures was limited. While they might suggest directions for expansion or encourage increased outlays for certain divisions, top executives were perforce limited to selecting from projects submitted. Their lack of familiarity with the specific details of projects lost in the screening process made it difficult for them to offer suggestions.

Finally, several types of projects were clearly being overlooked. One category included very safe projects promising a return of between 5% or 6% and 12%. These investments were in the cost reduction area and generally promised to continue producing savings long after the nominal 15 years used in calculating the economic value of the project. For example, this type of project would include such installations as power plants, plants for producing basic materials, and improvements in basic heavy equipment. An increase in outlays for these projects might tend to dampen existing cyclical earnings swings.

There seemed to be an equal lack of projects at the other extreme, the high-risk and high-return ventures. In this category were new products which faced great uncertainties in the market but which, if they succeeded, could provide MOCOM with handsome profits.

The problem with the high-risk projects, as the financial and planning group saw it, was the extent of the risk to the division or plant managers. "It is hard to get a division manager," noted one of the Central Staff analysts, "to commit himself and his division to a project which requires new assets equal to a major percent of the assets he has allocated to him at present. The risk (probability of success or failure) to him and to his division is the same as the risk to the corporation, but the extent of the risk (the seriousness of failure) is greater. If he guesses wrong and the project is a dud, he's got to do some explaining to show why his return on assets has dropped. But the potential returns are so great that the company could afford to have a bunch of duds for each one which pans out and still come off ahead." In essence, the planning staff believed that the utility curves of the division managers were quite different from the utility curve of the corporation as a whole. At lower organizational levels, this problem appeared even more severe.

Before analyzing this case from the perspective of the split-axis system, it is interesting to note the response of the students who dealt with it as a class assignment. The class consisted of approximately 25 graduate students in the administrative science curriculum with the majority being in the financial management program. The format of the course was to cover a body of material, such as "The Management of

Assets and the Need for Funds" or "Analysis of Past Financing and Future Funds Needs," followed by analysis of case studies reflecting the material that had been covered. Having just covered the text material on capital budgeting prior to preparing this case, about half of the students concentrated their analysis on the appropriateness of the 12% cutoff rate employed by MOCOM. Armed with sophisticated analytic techniques and Texas Instrument calculators, they accomplished a thorough and financially competent review of the cutoff rate, arriving at the conclusion that a marginal decrease of 1% or 2% might be more appropriate. In fact, the point can be made that the current cutoff rate is satisfactory or that it should be decreased marginally and reasonable men could disagree since existing techniques do not allow for a definitive answer. The real point here is that in spite of abundant indicators in the case that the problem was in the organizational decision-making process, many students essentially ignored the non-technical aspects. The remaining students recognized that a conflict of interests existed between top management and division managers but indicated no general consensus as to either the cause or the appropriate solution. These responses are interesting in that they reflect two deficiencies: (1) the unwarranted reliance on rational-technical analysis to provide solutions to problems; (2) the lack of a conceptual framework with which to approach non-technical organizational problems.

In applying the split-axis system to the MOCOM case, it is useful to begin by fitting the decision situation into the suggested typology. The typological component of the split-axis approach is being considered prior to addressing the role of nested environments because categorizing the decision situation gives an indication of what level in the hierarchy of nested environments should be chosen for purposes of analysis and alerts the analyst to predicted phenomenon associated with different decision situations. For the organization as a whole, i.e., organization structure, the appropriate categorization is the innovative planning case, or high-significance, long-time, few-precedents decision situation. Significance is high because the decision involves the commitment of major portions of organizational resources; additionally a failure to remain competitive and to continue growth would threaten the economic survival of the firm. The time dimension is high since there is no pressing time constraint in arriving at the decision outcome; subsidiary time considerations are similarly high in that the solution adopted will become a policy with a long-term duration. A determination of the precedence dimension is somewhat less easy in this case. It is clear that there are existing standard operating procedures for the capital budgeting decisions in the organization; this would seem to indicate a high precedence for the decision situation. However, the existing procedures for the capital

budgeting decisions were not established at a time when the very success of the firm was primarily dependent upon the efficiency and effectiveness of the capital investment process. Thus, a low precedence dimension is warranted since a new factor in the environment has so altered the decision situation for capital budgeting that "historical" solutions and existing procedures are not adequate. The very fact that top management is considering alteration of the existing 12% cut-off rate is evidence of this. In the decision situation typology, two predicted phenomenon occur in the high-long-few case (see the section on decision situation typology): (1) precedence is imposed where none exists causing an organizational response which ignores the uniqueness in the decision situation; (2) there tends to be a concern with procedural matters rather than effectiveness of policy. Both of these phenomenon are observable in the MOCOM case. Recalling that decision situations arise in response to problem areas in the task environment of the organization, it is clear that the environmental problem encountered by MOCOM was increased competition in its markets. The novelty in the problem is that the source of this competition was not the increased growth or activity of firms already in the chemical industry, i.e., MOCOM's "old" competitors among whom it is one of the industry leaders, but the intrusion of new, large, well-financed and well-managed firms attempting diversification into the chemical products market. The imposition of precedence in this situation occurred in MOCOM's

initial response to the problem, i.e., price competition. The trimming of profit margins by seeking to be more price competitive is a standard response to increased market competition in many industries; it may be supposed that this response had been successful for MOCOM in the past in dealing with its competitors. Only after attempting this standard response, for which precedence existed, did MOCOM's top management reexamine its position and recognize the need for an unprecedented level of investments in product research and development in order to remain competitive and to maintain growth. Having directed their attention to this problem, debate then centered around the appropriateness of the 12% cut-off rate, a technical, procedural question. Thus some argued for its elimination while others insisted it was an essential management tool. Both arguments assume that the cutoff rate is in fact the determining factor in attaining the desired level of capital investment recommendations from division managers; this is precisely the type of causal relationship the rational approach leads one to expect. As a result, much like the students who dealt with the case, MOCOM's top management concentrated on the technical, procedural aspect of the decision situation and had no comprehensive basis for dealing with the non-technical aspects. This occurred in spite of management's recognition that its primary influence on division managers was through performance evaluations, even though this relationship was not well understood.

Having applied the decision situation typology, a consideration of the nested environments being dealt with is necessary. In dealing with this decision situation it is necessary to delineate the relative components of the external environment, organization structure and the decision maker.

1. External environment: In this case there is insufficient information to address potentially relevant aspects in the extended external environment. In view of the important role that the diversification attempt of new, large firms plays, considerations about the national economic picture and about governmental regulations of trade could be significant. The elements in MOCOM's task environment with which the decision situation is concerned are its new competitors, the effect of these competitors on MOCOM's markets and the combined effects on MOCOM's stockholders.

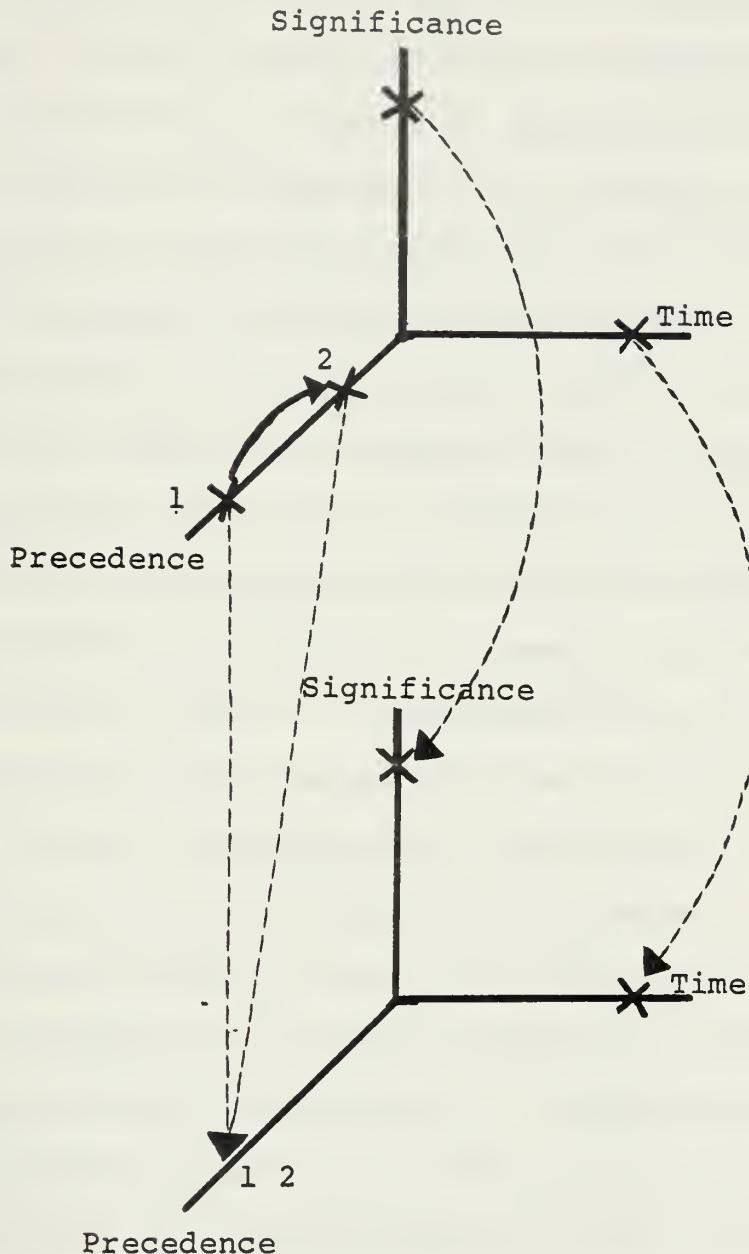
2. Organization structure: For purposes of this case, it does not matter significantly if the Capital Budget Review Committee or the Central Financial and Planning Staff is taken as representative of organization structure. In fact, the level of analysis could even be at the division level, allowing organization structure to be represented by the division manager and the subordinate decision maker to be one of his department heads, since the screening and response by the division manager in this situation is carried out in a similar manner at lower echelons. This ripple effect is precisely

what the concept of nested environments is intended to depict. In the subsequent analysis, the Central Financial and Planning Staff is taken to represent organization structure.

3. Decision-maker: The decision maker corresponding to the above level in organization structure is the division manager. It is noteworthy that even though this is not the level of formal authorization for a capital investment decision, it is clearly the level of control; this circumstance is increasingly true if the process is shifted down one level in nested environments and examined internal to the division.

Having identified the relevant organizational elements for this level of analysis of the decision situation, an examination of the corresponding communication of the decision dimensions is in order. Fig. 5 is offered to supplement this discussion. As pointed out in the discussion of the typological categorization of this decision situation, MOCOM's initial response was to the high-significance, long-time, many-precedents case, i.e., price cutting, and subsequently reflected the high-long-few case. (This is indicated in Fig. 5 by an initial high position for point 1 on the precedence axis for organization structure, followed by a shift to point 2 indicating low precedence.) At the point of development of the situation in the case, no action or policy change has been arrived at by top management, but for discussion purposes assume that it is decided to lower the cutoff rate from 12%

ORGANIZATION STRUCTURE
(Central Financial & Planning Staff)



DECISION MAKER
(Division Manager)

FIG. 5 - Showing Communication of Decision Dimensions
for MOCOM

to 10% in order to encourage the division managers to increase the volume of capital investment recommendations. Assume in addition that along with notification of the cut-off change the division managers are to receive a letter signed by MOCOM's president emphasizing the need for increased capital investments in research and development. A fundamental proposition of the split-axis system is that organization structure desires the decision maker to locate decision dimensions in the same relative positions as the organization does; doing so increases the probability that the decision maker's response to the decision situation will be acceptable in organizational terms. An examination now of the decision maker's evaluation of the decision dimensions for capital investments reveals two significant conclusions. At the time MOCOM instigated price cutting (shown at point 1 in Fig. 5 for the decision maker's axis), the relative evaluation of decision dimensions by the decision maker would correspond to that of organization structures, i.e., high significance, long time and many precedents. The positions for time and precedence occur for the same reasons as they did in organization structure's set of axis. However, an understanding of why significance is high for the decision maker leads to the first important conclusion. Recalling that significance is a function of threat to survival and/or high resource commitment, it is clear that substantial capital investments

recommended by a division manager commit a high percentage of the assets he controls. More importantly, as pointed out in the last paragraph of the case, such investments also represent a threat to his survival (as division manager) should they go sour. Thus, the survival aspect in significance is high both for organization structure and the decision maker, but for diametrically opposite reasons; i.e., the organization's survival is threatened if it fails to make substantial increases in capital investments, whereas the decision maker's organizational survival is threatened if he does make significant recommendations for divisional capital investments. The second conclusion is derived from the decision maker's evaluation of decision dimensions subsequent to organization's shift from point 1 (Fig. 5) with respect to precedence to point 2, i.e., from high to low. If organization structure's policy decision was as conjectured, i.e. reduce the cutoff to 10% and presidential emphasis on investments, it would probably be of insufficient magnitude to affect the decision maker's perception of precedence in the decision situation. To begin with, what may represent a significant procedural change to a specialist, i.e. the financial analysts on the Central Financial and Planning Staff, may appear as trivial to a division manager whose background and routine concerns are not focused on the fine points of financial management. More importantly, the organization's policy does nothing to

change the existing scheme for performance evaluation of the division manager or to relieve him from the high burden of risk he is expected to incur in making recommendations for substantial capital investments. As a consequence, structure will have failed in generating a low precedence perception by the decision maker.

As a last step, a discussion of the role of critical variables in the MOCOM case provides some tentative solutions to the problems already encountered in this decision situation. Fig. 6 is offered to supplement this discussion. The environmental problem of increased competition for markets, which gives rise to organization's concern with the capital investment problem, generates an environmental critical variable (CV_1), market share. MOCOM's ability to achieve its growth objectives is a function of its ability to control this variable in the environment. After an initial false start, i.e. price cutting, MOCOM accurately perceived that the intra-organizational variable upon which CV_1 (market share) was dependent was the increase in capital investments for research and development. The recognition that this was an area they were failing to exploit in their current operations and which provided the means to remain competitive generated the corresponding organizational critical variable, CV_2 . Their accurate perception of the situation is reflected in the direct linkage of CV_1 and CV_2 , i.e. a successful increase in

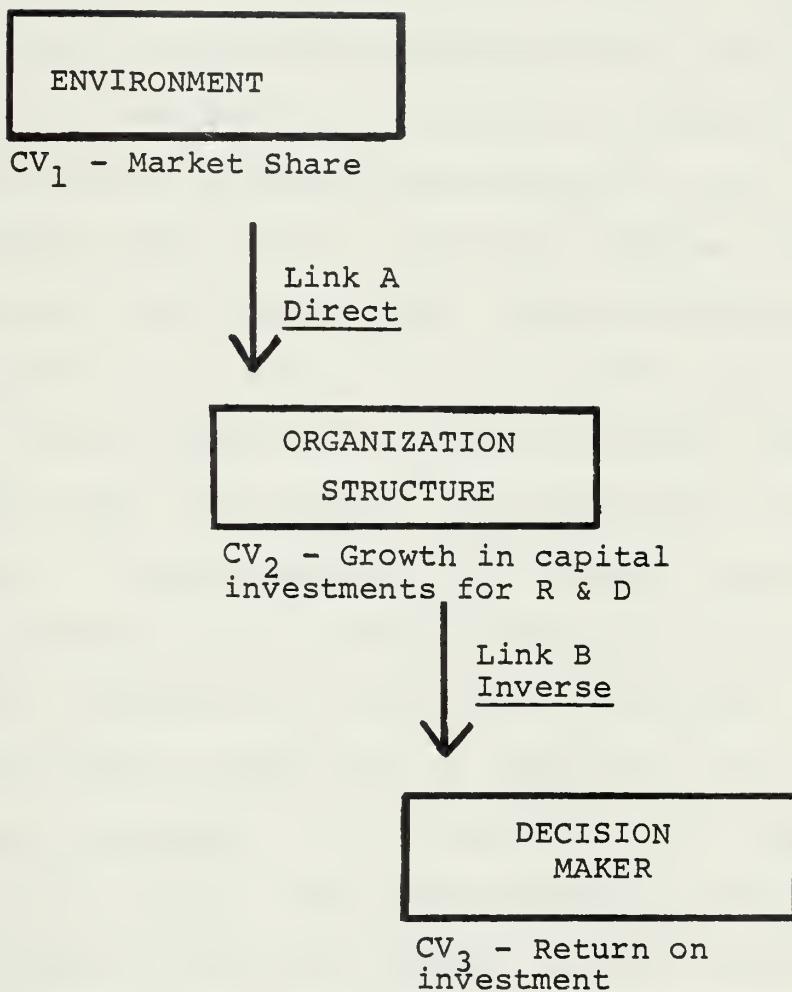


FIG. 6 Showing nature of linkages between critical variables in MOCOM

CV_2 will improve the state of CV_1 , market share. For the division manager, however, the critical variable in the decision situation is the calculated return on investment (ROI) for his division because of its dominant effect on his performance evaluation. In reviewing the indices used by the organization for performance evaluation (see the section under Decentralized Management in the case) it appears that only ROI and divisional operating percentages are in a quantifiable form. Growth trends, along with other informal factors, are considered but are less tangible. Since measurable performance criteria (i.e. recall the role of MOE's pointed out earlier) tend to receive the greatest attention and in light of the past lower significance organizationally of capital investments, it is predictable that division managers would see the dominant factor in their performance evaluation as the critical variable in a wide range of decision situations. Due to the manner in which ROI is computed, the linkage between CV_3 and CV_2 is inverse, i.e. an increase in one results in a decrease of the other. The organizational effort to address CV_1 must begin by creating a direct linkage between CV_2 and CV_3 . The obvious way to do so is to alter the scheme for performance evaluation; e.g., by quantifying the growth trend index, thereby heightening its visibility to division managers, and weighting it relative to the computation of ROI, the willingness to incur the risks can be encouraged; alternatively,

the risks presently incurred disproportionately by division managers in capital investment recommendations could be borne by the organization as a whole by adopting appropriate procedural changes. Whatever method is chosen, it must be designed to establish a direct linkage between CV_2 and CV_3 .

The picture developed by the split-axis approach to the case is somewhat different from that which was seen by most of the students who dealt with it or, for that matter, by MOCOM's top management. Now, instead of dealing with the problem as though it is a rational-technical question about cutoff rates, or alternatively, that the organization is plagued with incompetent division managers, it becomes clearer that the real problem is one of organizational design for decision making. The often expressed viewpoint that "The system is fine, you just can't depend on the people" is one which is seldom appropriate. While clearly every organization does suffer as a result of people it can't depend on, at the same time they suffer due to faults in organizational design which often go unseen and unremedied for lack of a conceptual framework which will deal with them.

The split-axis system approach offers the capability to identify such design flaws for particular decision situations and to prescribe the nature of appropriate solutions such that rational-technical methods can then be applied effectively.

VIII. CONCLUSIONS

This thesis has had as its primary objective the construction of a conceptual framework for the analysis of organizational decision-making. The anticipated dominant characteristic of such a framework was that it would synthesize the positive contributions of existing approaches to decision-making. Subsidiary but significant characteristics sought in such a framework included the following:

(1) that the approach taken serve to accurately describe the decision process as it occurs in real-world organizations, i.e., that it be a good descriptor; (2) that the descriptive content of the framework, when supplemented by hypothesized relationships between elements of the framework, would allow for a predictive capability; (3) that the scope of the approach would encompass a wide range of organization and decision types and yet have sufficient structure and detail to allow for analytic usefulness.

The synthesizing capability of the split-axis approach can be seen in the interaction of the three existing approaches to organization theory and decision-making portrayed in this conceptual framework. The hierarchical and rational aspects of the classical approach are represented in the top-down perspective of organization structure whereas the behavioral considerations of the neo-classical approach are encompassed in the bottom-up perception of decision situations

by decision makers. Contingency theory's consideration of the role of environment is addressed in the concept of nested environments; its situational stance is reflected in the framework's observation that understanding the decision process is dependent upon specifying the particular decision being dealt with, upon the organizational level observed in the process, and upon whether the actual decision maker is operating in the top-down or bottom-up mode. In addition to incorporating contributions from the three existing approaches, the conceptual framework hypothesizes both motivational and cognitive relationships in the organizational system, i.e., a fundamental motive for all elements is uncertainty reduction in the environment and the cognitive processes involved in dealing with external environment (bottom-up) are cybernetic in nature, while those that deal with internal environment (top-down) are normatively rational.

Due to the requirement for descriptive accuracy, this paper has avoided taking normative positions which attempt to correct "aberrations" frequently observed in the decision-making process. Instead, the effort has been directed toward describing how and why those "aberrations" occur and portrays them as the predictable consequences of "normal" organizational relationships. In fact, what are perceived as aberrations from the rational perspective become understandable and effective mechanisms for reducing uncertainty in the

local environment when viewed cybernetically, e.g. subunit optimization of goals at the expense of the organization as a whole; "empire building;" the concern with efficiency of procedures instead of effectiveness of policy; the conservative pattern of reaction coupled with the short-run perspective in decision-making in lieu of long-range, proactive decisioning; etc.

The augmenting of this descriptive frameowrk with predictive relationships occurs in three points:

(1) In the typology of decision situations it is hypothesized that predictable techniques are employed with certain decision situations. As a consequence, once the decision has been categorized organizationally, patterns of response can be anticipated.

(2) In the communication of decision dimensions in the split-axis approach, the predicted consequences of the ordered perception of decision dimensions are associated with the decision maker's subjective interpretation of those dimensions.

(3) In the organizational effort to link critical variables, the effects of both success and failure in doing so are hypothesized.

The scope of this paper does not allow for the attempt to experimentally validate these hypothesized relationships and their predicted consequences. This omission points out

the required future direction in the development of the split-axis approach. The attempt to experimentally validate such approaches is imbued with both theoretical and technical pitfalls; nonetheless the need for such work is clear and while rare has sufficient precedence to offer direction, e.g., Eoyang's dissertation⁸⁸, which experimentally validated Ashby's "Law of Requisite Variety;" Hage's support for his conclusions⁸⁹; and the potential offered by techniques used by experimental psychologists in their field.

The requirement for scope sufficient to embrace multiple types of organizations and multiple types of decision situations has been addressed by offering a wide range of examples and supporting quotations representing a diversity of orientations. While many of the examples, including the short case study, are related to commercial organizations, this is due to the fact that much of the earlier work in this field has been so directed and not because the approach is inapplicable to non-profit organizations or questions of public policy formulation. The parallels drawn to Allison's classic work⁹⁰ give evidence of the potential for extending the split-axis approach further

⁸⁸ Eoyang, D. K., Organizational Variety: A Cybernetic Approach, Stanford University Press, December 1975.

⁸⁹ Hage, J., Communication & Organizational Control: Cybernetics in Health and Welfare Settings, Wiley, 1974.

⁹⁰ Allison, G. T., "Conceptual Models and the Cuban Missile Crisis."

in the consideration of bureaucratic and governmental decision-making.

Thus, while the primary considerations envisioned in accomplishing the objective of this paper have been addressed and, hopefully, reasonably accounted for, more work is left to be done in supporting the split-axis approach to organizational decision-making than has been done in developing it. It is hoped that the conceptual framework developed here is of sufficient plausibility to warrant the effort required to expand it.

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